Service Manual

FOR THE TURBOCHEF® HIGH h CONVEYOR 2020™ OVEN

For further information, call

800.90TURBO

or

+1 214.379.6000

Table of Contents

Important Safety Information – Please Read First

Improper installation, adjustment, alteration, service, or maintenance of this equipment can cause property damage, injury, or death. Thoroughly read the installation, operating, and maintenance instructions before installing or servicing this equipment. Strictly adhere to the following safety information to reduce the risk of:
▢ Damage to the oven
▢ Damage to property near the oven
▢ Personal injury
▢ Burns
▢ Fire
▢ Electric shock

General Safety Information

▢ Use this appliance only for its intended uses as described in this manual.
▢ Only qualified service personnel should service this appliance. Contact the nearest authorized service facility for examination, repair, or adjustment.
▢ Always ensure the oven is disconnected from the power supply before servicing, repairing, or adjusting any components or parts.
☒ DO NOT place the cord near heated surfaces.
☒ DO NOT store or use flammable vapors or liquids (e.g., gasoline) in the vicinity of this appliance.
☒ DO NOT allow children to use this appliance.
☒ DO NOT place corrosive chemicals or vapors in this appliance. It is not designed for industrial or laboratory use.
☒ DO NOT operate this appliance if it:
    Has a damaged cord or plug
    Is not working properly
    Has been damaged or dropped
☒ DO NOT cover or block any openings on this appliance.
☒ DO NOT store this appliance outdoors.
☒ DO NOT use this appliance near water.
☒ DO NOT immerse this appliance or any of its components (e.g., cord, plug, etc.) in water.
☒ DO NOT let the cord hang over the edge of a table or counter.

Reducing Fire Risk

If materials inside the oven ignite or if smoke is observed,
1. Turn off the oven.
2. Disconnect the power cord or shut off power at the fuse/circuit breaker panel.

▢ Carefully attend the oven if paper, plastic, or other combustible materials are placed inside the oven to facilitate cooking.
☒ DO NOT leave items in the cook cavity when the oven is not in use.
☒ DO NOT cook items wrapped in cling wrap or plastic film.
☒ DO NOT overcook food.

Preventing Oven Damage

- When servicing this appliance, do not tear insulation to get to components. Rather, find the edge of the insulation and remove the tape that holds it in place.
- Clean the oven daily.
- Clean the oven only with TurboChef Oven Cleaner.
- DO NOT clean with a water jet.
- DO NOT allow cleaning solution or water to remain in the cook cavity longer than necessary.

Grounding Instructions

⚠ WARNING: Improper grounding increases the risk of electric shock.

This appliance must be grounded. The cord is equipped with a grounding wire and plug, which in the event of an electrical short circuit, reduce the risk of electric shock by providing an escape wire for the electric current. The wire must be plugged into an outlet that is properly installed and grounded.

Consult a qualified electrician or serviceman to determine whether or not the appliance is properly grounded.

- DO NOT use an extension cord. If the power supply cord is too short, request a qualified electrician or serviceman to install an outlet near the appliance.

Power Cord Replacement

To avoid potential hazards, only the manufacturer, its service agent, or a similarly-qualified person should replace a damaged power cord.

Specifications and Installation

8.5"
(216 mm)

35.7" (907 mm)
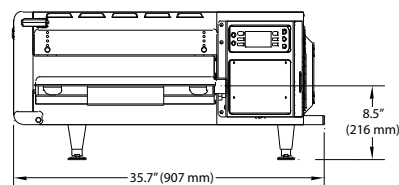
Figure 1: Oven Dimensions - Side

60.1" (1527 mm) with extensions
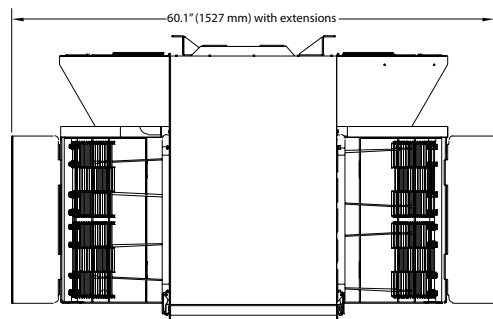
Figure 2: Oven Dimensions - Top

48.3" (1227 mm)

13.0"
(330 mm)

17.0"
(432 mm)

4.0" (102 mm)
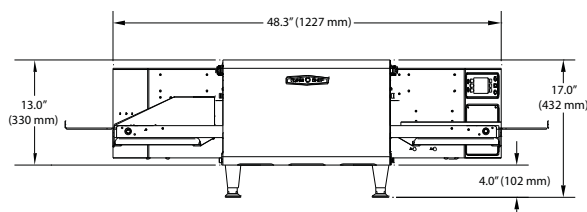
Figure 3: Oven Dimensions - Front (Single)

13.0"
(330 mm)

30.0"
(762 mm)

13.0"
(330 mm)
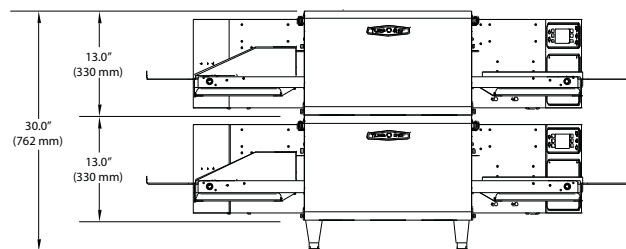
Figure 4: Oven Dimensions - Front (Double)

13.0"
(330 mm)

43.0"
(1092 mm)

13.0"
(330 mm)

13.0"
(330 mm)
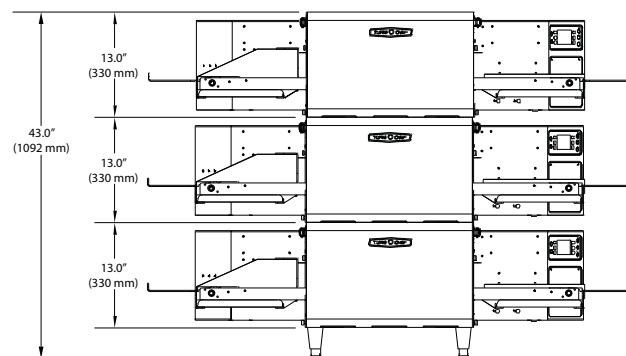
Figure 5: Oven Dimensions - Front (Triple)

Dimensions
Exterior

Height	13.0" (330 mm)
with legs	17.0" (432 mm)
Width	48.3" (1227 mm)
with extensions	60.1" (1527 mm)
Depth	35.7" (907 mm)

Conveyor

Length	48.3" (1227 mm)
Width (Single)	20.0" (508 mm)
Width (50/50)	9.5" / 9.5" (241 mm / 241 mm)
Width (70/30)	15" / 4" (381 mm / 102 mm)

Electrical Specifications

North America
3 Phase
208/240 VAC
50/60 Hz
40 amp current draw
Max Input: 14.4 kW
4-wire supply
NEMA 15-50P plug (4-pin IEC60309 available by special order)
50-amp max circuit breaker protection

Europe/Asia (220-240 VAC)
3 Phase
220-240 VAC
50/60 Hz
40 amp current draw
Max Input: 14.4 kW
4-wire supply
IEC60309 4-pin plug
64-amp max circuit breaker protection

Europe/Asia (380-415 VAC)
3 Phase
380-415 VAC
50/60 Hz
20 amp current draw
Max Input: 14.4 kW
5-wire supply
IEC60309 5-pin plug
32-amp max circuit breaker protection

Packaging

All ovens are packaged in a double-wall corrugated box with integrated wooden skids. All international ovens shipped via Air or Less than Container Loads are packaged in wooden crates.

Certifications

Oven Construction

- 430 stainless steel front, top, sides, and back
- Cool to touch covers and panels
- Stainless steel interior
- 20-inch-wide cook chamber

Installation Instructions

The TurboChef® HhC 2020™ conveyor oven is designed and certified for safe operation when installed in accordance with local and/or national codes. It is the owner and/or installer's responsibility to comply with any codes that may exist. Install this oven according to the policies and procedures outlined below and throughout this manual.

⚠ WARNING: Death, injury, and equipment damage can result from improper installation, or installation of a unit damaged during shipment or storage.

⚠ WARNING: Do not install an oven suspected of damage. Improper installation or the installation of a unit damaged during shipment or storage may void the Limited Warranty.

Delivery and Initial Inspection

All TurboChef® ovens are shipped so as to prevent damage.

Upon delivery, inspect the shipping container for external damage. Any evidence of damage should be noted on the delivery receipt, which must be signed by the driver.

Upon removing the oven from its shipping carton, check for any possible damage. Make note of any damage and contact the shipping company to file a claim. Carriers will accept claims for concealed damage if notified within fifteen days of the delivery and if the shipping container is retained for inspection.

TurboChef does not assume responsibility for any loss or damage suffered in transit. The carrier assumes full responsibility for delivery in good order when the shipment is accepted. However, when necessary, TurboChef can assist in filing a claim.

Lifting the Oven

⚠ WARNING: The oven weighs approximately 195 lbs (88.5 kg). Two or more people are required to lift it.

Position one or more persons on either side of the oven. Lift from the bottom. The countertop must be at least 30" (762 mm) deep and capable of supporting 200 lbs (90.7 kg) per oven.

Once properly positioned on the counter, plug the oven into a wall mounted electrical receptacle. See Electrical Specifications on page 1.

Oven Location and Placement

⚠ WARNING: Death, injury and equipment damage may result from improper positioning.

⚠ WARNING: DO NOT stack ovens more than three high.

It is the operator's responsibility to ensure the oven is properly positioned on countertop. TurboChef will not warrant any damage or injury to ovens that fall off countertops due to improper placement.

Proper placement of the oven will enhance long-term operator convenience and satisfactory performance. Be sure to place the oven in an area accessible for proper operation and servicing.

The surface on which the oven is placed must be at least 30" (762 mm) deep and capable of supporting 200 lbs. (90.7 kg) per oven. The manufacturer shall not assume liability for damage or injury resulting from the improper installation of this equipment, including temporary or unstable work stations or countertops.

The oven must be installed level front to back and side to side. For additional stability, the oven legs may be bolted to the countertop if desired.

⚠ WARNING: DO NOT use this appliance with out the legs installed. When stacking, the legs must be installed on the bottom oven only.

Stacking Ovens

⚠ WARNING: Make sure all HhC 2020 ovens are unplugged before stacking.

⚠ WARNING: DO NOT stack ovens more than 3 high.

⚠ WARNING: DO NOT attempt to lift the oven with fewer than 2 people.

1. Remove the legs from the oven(s) that are going to be stacked on top.
2. Stack the top oven on the bottom oven. If stacking three ovens, stack only the middle oven at this point.
3. Remove the 4 screws marked A in Figure 6, below.
4. Align each bracket with the holes in the bottom oven and reinstall the screws marked A in Figure 6, below.
5. Remove the 2 screws marked B in Figure 6, below.
6. Align each bracket with the holes in the top oven and reinstall the screws marked B in Figure 6, below.
7. If stacking three ovens, repeat steps 2-6 above to stack the top oven to the middle oven.
8. Ensure each stacked oven is secured to the oven beneath it via two stacking brackets – one on each side.

Figure 6: Stacked Ovens

SPECIFICATIONS AND INSTALLATION
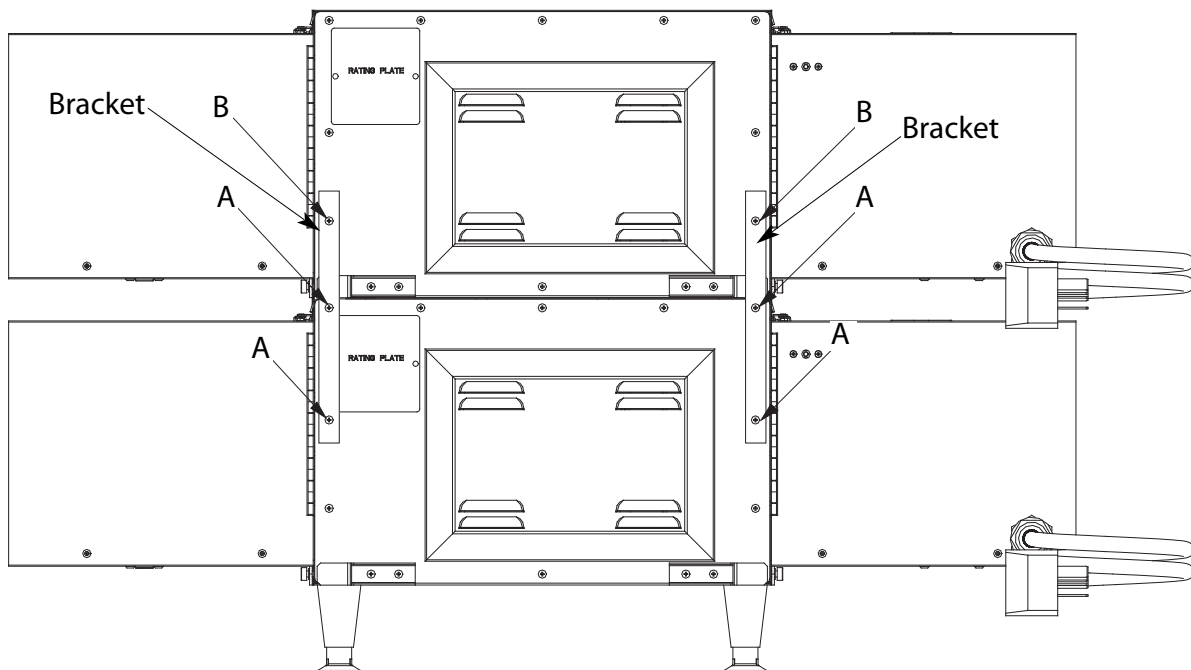
Installation Near Open Heat Source

See Figure 7. When placing a TurboChef® oven near an open heat source, strictly adhere to the following:

- If the oven is being placed near a grill or stove, a divider must exist between the oven and the open heat source, with a minimum of 6" (152 mm) between the oven and the divider.

- If the oven is being placed near a fryer, a divider must exist between the oven and fryer, with a minimum of 12" (305 mm) between the oven and the divider.

- The height of the divider must be greater than or equal to the height of the oven(s) - page 1.

- Verify oven location has a minimum 10" (254 mm) clearance on top and minimum 2" (51 mm) of clearance on each side.

Ventilation Requirements

The HhC 2020 should be operated underneath a ventilation hood, except where local laws or codes allow for use without a ventilation hood, unless the oven is a UL-certified ventless model (available upon request). For more information or to order a ventilation hood, contact 800.90TURBO, +1 214-379-6000, or your local distributor.

The HhC 2020 ventless model oven has been tested by Underwriters Laboratory, which has concluded that this oven can be installed and operated ventless for all food items except for fatty raw proteins, such as bone-in, skin-on chicken, uncooked hamburger, fat-laden steaks, etc.

NOTE: In no event shall the manufacturer assume any liability for damages or injuries resulting from installations that are not in compliance with local and national codes, and with the instructions previously listed.
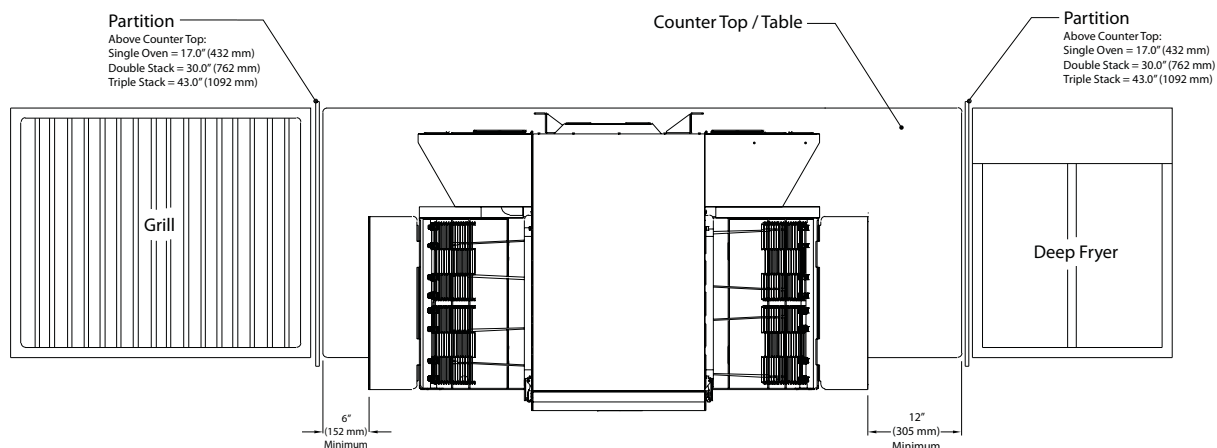
Figure 7: Installation Near Open Heat Source

Cleaning - Daily and Weekly

Daily Cleaning Instructions

 = Wash, rinse, sanitize. (Use only TurboChef-approved cleaner, part number 103180).

 = Completely dry with clean towel.

⚠ WARNING: Always disconnect power before cleaning or servicing the oven.

⚠ WARNING: DO NOT attempt to clean the oven until it has cooled (screen reads "Oven Off").

⚠ WARNING: DO NOT use a water jet when cleaning the oven.

1

2

3

4

5

6

7

8
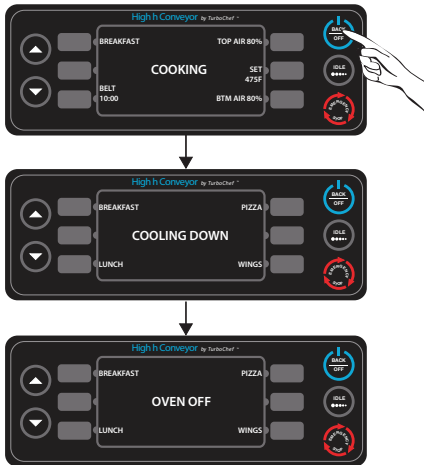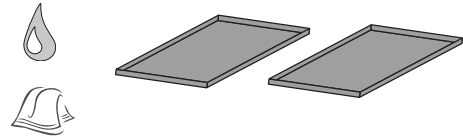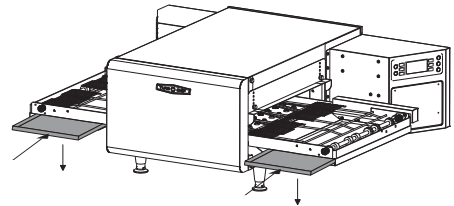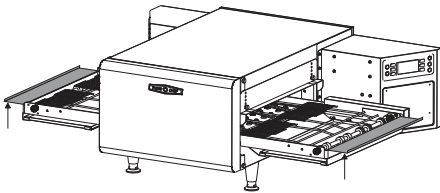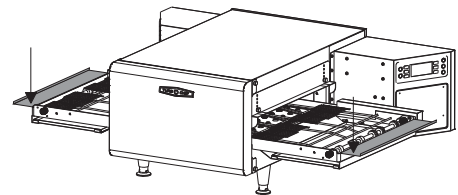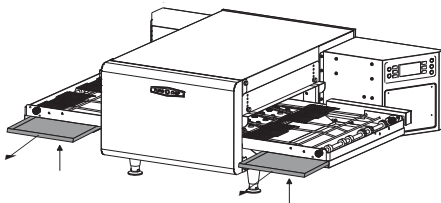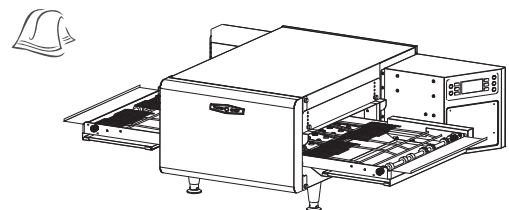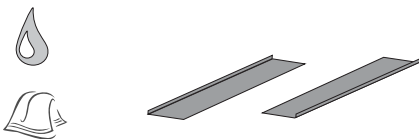
CLEANING

Weekly Cleaning Instructions

= Wash, rinse, sanitize. (Use only TurboChef-approved cleaner, part number 103180).
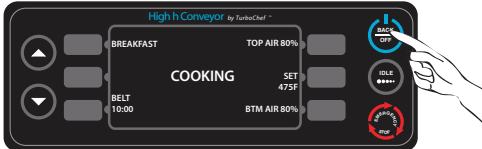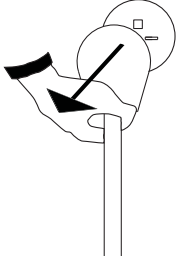
= Completely dry with clean towel.

⚠ WARNING: Always disconnect power before cleaning or servicing the oven.
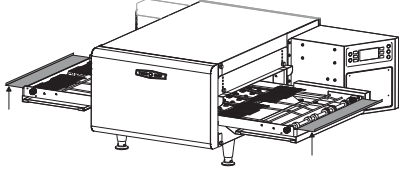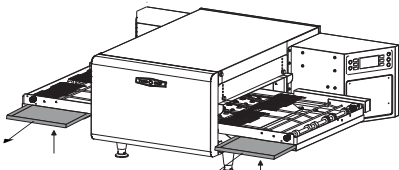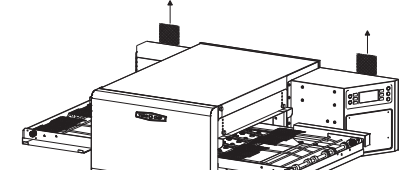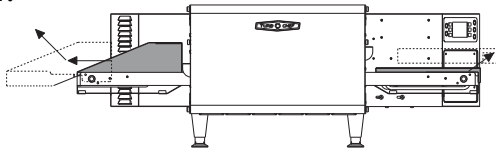
⚠ WARNING: DO NOT attempt to clean the oven until it has cooled (screen reads "Oven Off").

⚠ WARNING: DO NOT use a water jet when cleaning the oven.

Step 1: Turn the Oven Off

1.

2.

Step 2: Remove Outer Oven Components

1.

2.

3.

4.

*5.

Unlatch

* Note: The front hatch of a stacked oven will contact the oven beneath it, preventing it from opening all the way. To access interior components of a stacked oven, the hatch must be entirely removed.

Step 3: Remove Inner Oven Components

1.
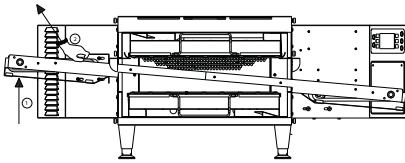
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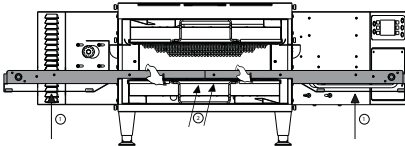
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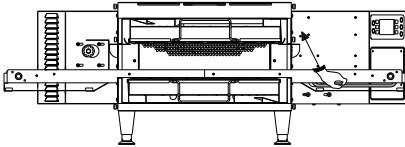
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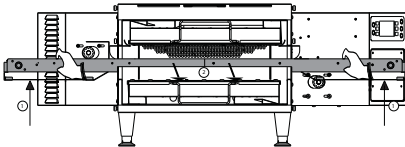
5.
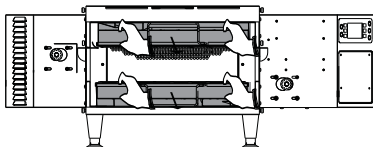
Step 4: Clean Oven Components

1.
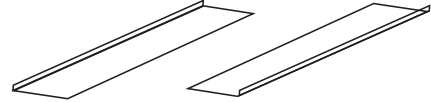
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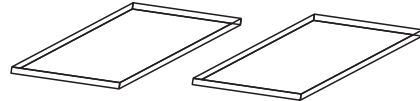
3.

Replace filters if damaged or torn.
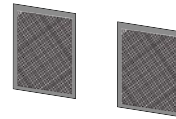
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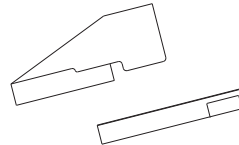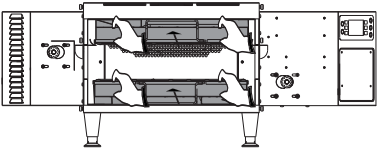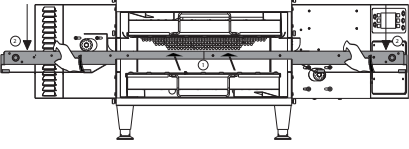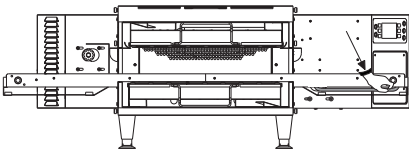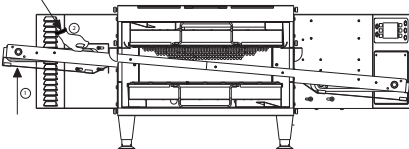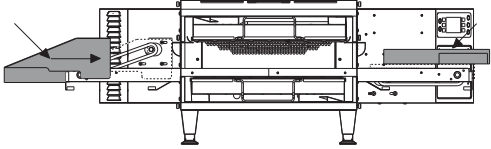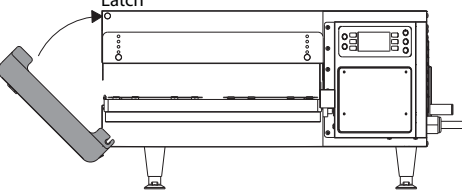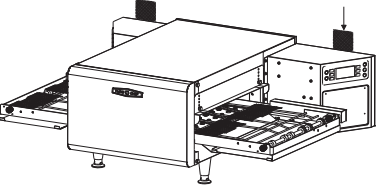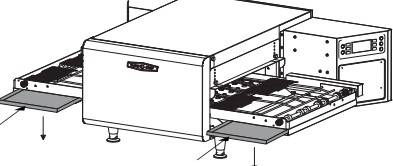
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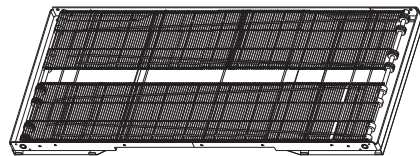
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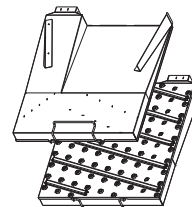
Step 5: Reinstall Oven Components

1.

2.

3.

4.

5.

6. Latch

7.

8.

9.
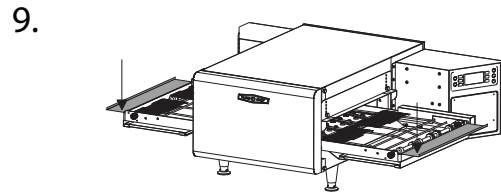
Step 6: Verify Chain Tension

See detail below.

A

B
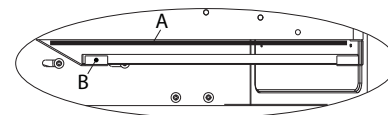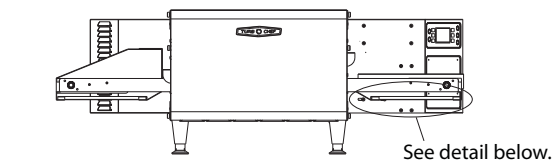
Acceptable - Chain (A) is tight and
easily clears crumb tray holder (B)

A

B
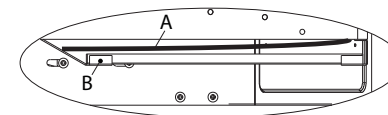
Call service to have link removed - Chain (A) is
loose and risks contact with crumb tray holder (B)

Step 7: Ready the Oven for Use

1.

2.
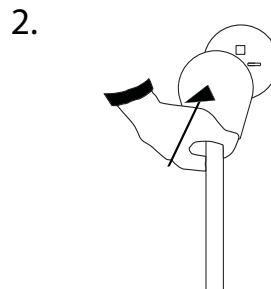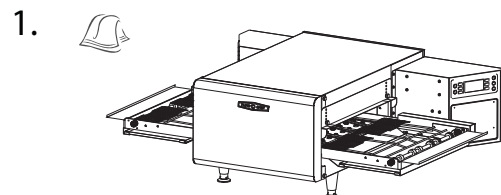
Standard Oven Operation
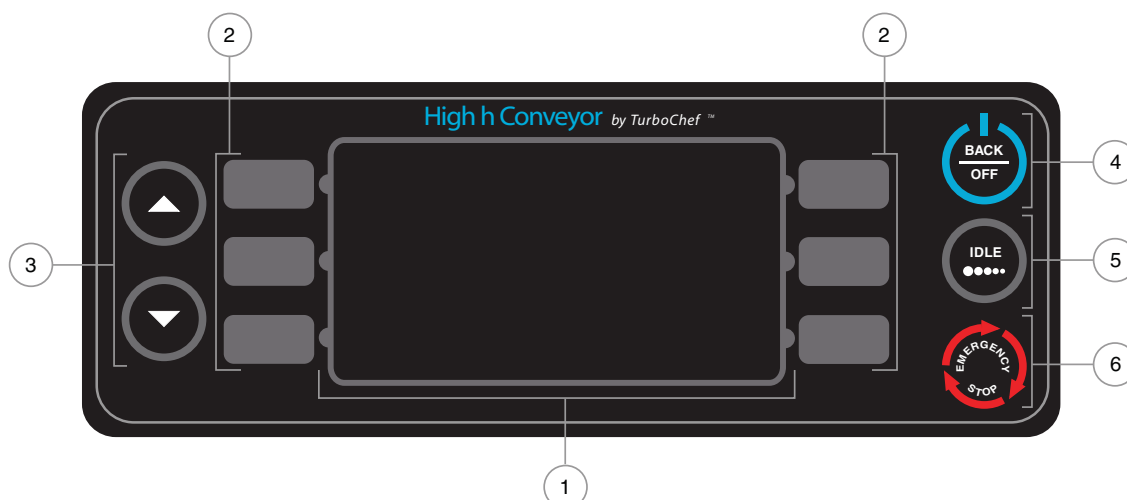
Figure 8: Oven Controls

Oven Controls

Figure 8.

1. Display

The display shows current oven operation and/or user programming information.

2. Soft Keys

Six soft keys are on the oven controls, three on the left (L1, L2, L3, where L1 = top) and three on the right (R1, R2, R3, where R1 = top). Press a soft key to select the option/command that is adjacent to it.

Soft keys are labeled in this manual for identification; however, they are not labeled on the actual oven keypad.

3. Up and Down Keys

When the oven is in the OVEN OFF MODE, use the up key to access the CONFIG MODE (page 15). Use the down key to access cooking profiles 5-8.

Also, press the up and down keys to adjust various oven settings (see pages 13-20).

4. Back/Off Key

Depending on the mode the oven is in, the back/off key will return the oven to the previous screen or turn the oven off (page 10).

5. Idle Key

The idle key activates the IDLE MODE (page 11).

6. Emergency Stop Key

The emergency stop key shuts down the conveyor and heaters and returns the oven to the OVEN OFF MODE (page 10).

NOTE: Depending on the temperature within the oven, the cooling fans will remain on to prevent damage to critical oven components.

⚠ CAUTION: DO NOT use the emergency stop key as a general on/off switch. Doing so can damage the oven and shorten its life span.
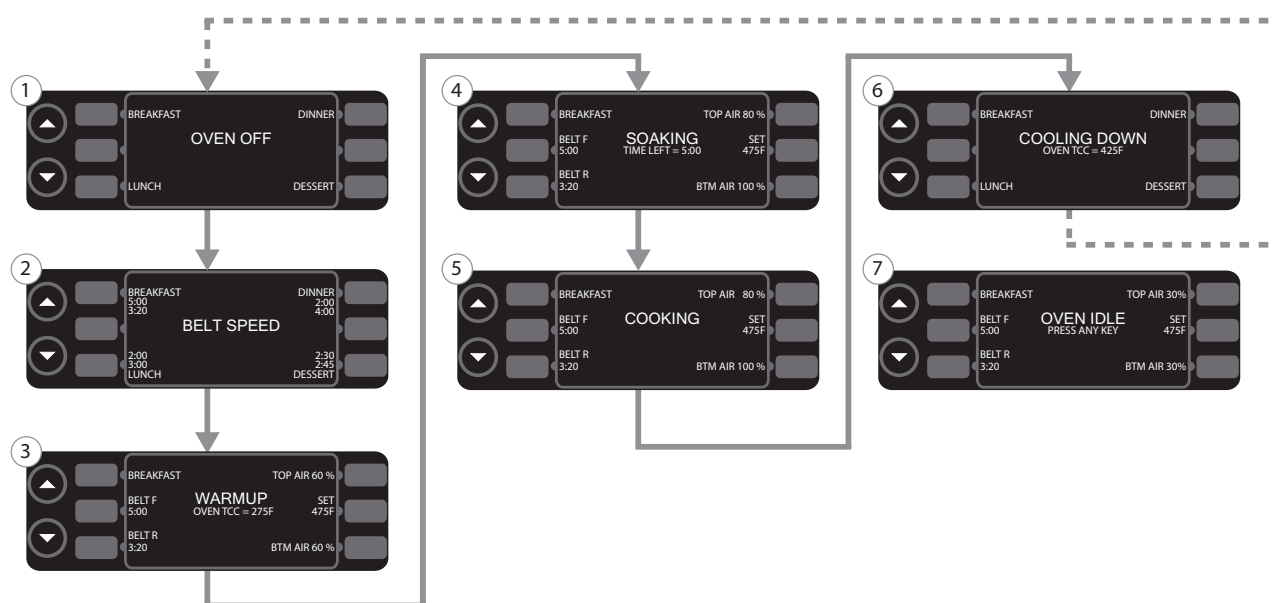
Figure 9: Cooking Modes

Cooking a Product

This section explains how to cook a food product by describing the "standard operation" modes through which the oven progresses (Figure 9).
-MODE 1: Oven Off
-MODE 2: Belt Speed Select
-MODE 3: Warming
-MODE 4: Soaking
-MODE 5: Cooking
-MODE 6: Cooling Down
-MODE 7: Idle

NOTE: MODE 7 is not part of a "standard" cooking cycle. It only occurs when the user intervenes as described on page 11.

Mode 1: Oven Off

Mode during which all cooking components are off and the oven temperature has receded below 150°F (66°C), but the display and keypad remain on. The user can access cooking profiles 1-4 on this screen (1) or press the down key to access cooking profiles 5-8.

Happens When...
-Power is supplied to the oven.
-The oven completes MODE 6.
-The user presses the down key while accessing the CONFIG MODE (refer to page 15 for more information).

Goes To...
-MODE 2 when the user selects a cooking profile (soft keys L1, L3, R1, or R3).
-CONFIG MODE when the user presses the up key.

Mode 2: Belt Speed Select

Mode during which the user selects the desired belt speed.

NOTE: If a different key is pressed, the oven will ask if you wish to continue or return to the belt speed select screen. If you select continue, the oven will not save the belt speed.

Happens When...
-The user selects a cooking profile from MODE 1 or 6.

Goes To...
-MODE 3.

Mode 3: Warming

Mode during which the oven warms to the preset cooking temperature defined by the cooking profile that was selected.

Happens When...
- A selection is made from MODE 2, and the oven's temperature at the beginning of warmup was not within (less than) 25°F (14°C) of the oven's set temperature.

Goes To...
- MODE 4 once the oven has reached the temperature defined by the selected cooking profile.
- MODE 6 when the user presses the back/off key and the oven temperature is above 150°F (66°C), or MODE 1 if the oven temperature is below 150°F (66°C).

Mode 4: Soaking

Mode during which the oven has completed warming up and automatically allows an additional five minutes for the oven cavity surfaces to warm.

Happens When...
- MODE 3 completes (within 5°F [3°C] of set point)

Goes To...
- MODE 5 when soaking completes.
- MODE 6 when the user presses the back/off key.

Mode 5: Cooking

Mode during which the oven is ready to cook. The user can place food on the conveyor to cook, or edit cook settings if the full edit or flex option is enabled. See page 12 for more information on full edit and flex options.

Happens When...
- MODE 4 completes.
- The user presses the idle key, up key, down key, or any soft key during MODE 7.

Goes To...
- MODE 6 when the user presses the back/off key.
- MODE 7 when the user presses the idle key.
- MODE 3 if the temperature drops 25°F (14°C) or more below the set point.

Mode 6: Cooling Down

Mode during which the heater shuts off to allow the oven to cool.

Happens When...
- The user presses the back/off key from MODE 3 (and the oven temperature is above 150°F [66°C]), or from MODES 4, 5, or 7.

Goes To...
- MODE 1 when the oven temperature has receded below 150°F (66°C).
- MODE 2 when the user selects a cooking profile.

Mode 7: Idle

Mode during which both blowers are reduced to 30% and the belt speed reduces to 15 minutes to save power. All other oven components remain the same.

NOTE: Press the idle key once to begin a countdown (time of the countdown is determined by the current belt speed). Press the idle key twice to immediately place the oven into IDLE MODE.

Happens When...
-The user presses the idle key from MODE 5.

Goes To...
-MODE 5 when the user presses the idle key, up key, down key, or any soft key.
-MODE 6 when the user presses the back/off key.

Editing a Cooking Profile

To edit a cooking profile, the oven must be in the COOKING MODE, and the full edit or flex option must be enabled for each option you want to edit. For more information on selecting between full edit, rigid, and flex options for each editable setting, see *Edit Modes Select Screen* on page 16.

When the rigid option is enabled for a given setting, the soft key adjacent to that setting (Figure 10) is disabled and no menu editing is allowed.

When the full edit option is enabled for a given setting, that setting is fully customizable and changes are saved once the oven returns to the OVEN OFF or COOLING DOWN MODE.

When the flex option is enabled for a given setting, that setting is customizable within flex option limitations (as described in the following sections), and changes will reset when the oven returns to the OVEN OFF or COOLING DOWN MODE. NOTE: The flex option does not apply to editing a profile name.

This section assumes that the full edit option is enabled (except where otherwise noted) and that a cooking profile and belt speed have been selected.

Changing a Cooking Profile Name

1. From the cooking screen (Figure 10), press L1 to access the name change screen (Figure 11).

2. Change the name of the cooking profile.

    - The up key moves forward through the available characters. e.g. A,B,C…

    - The down key moves backward through the available characters e.g. A,+,-, ,9,8…

    - INS (L1) inserts a space.

    - DEL (R1) deletes the selected character.

    - ---> (R2) moves the cursor to the right.

    - <--- (L2) moves the cursor to the left.

3. Press save (R3) to save the changes or cancel (L3) to cancel any changes.

Figure 10: Cooking Screen
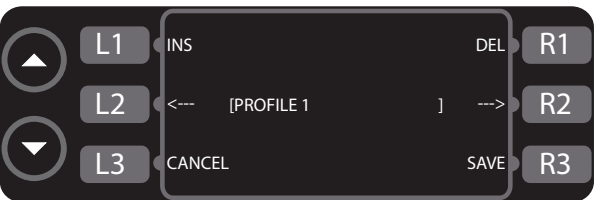
Figure 11: Name Change Screen

Adjusting the Belt Speed

The High h Conveyor Oven can accommodate either one or two conveyor belts. The oven will automatically detect the number of conveyor belts installed and display the option to change the speed of each conveyor belt independently.

1. From Figure 10, press the soft key adjacent to the conveyor belt you wish to adjust (press L2 for the front belt [Belt F] or L3 for the rear belt [Belt R]).

2. Adjust the time it takes for the conveyor belt to completely cycle through the oven.

   - The up key increases bake time in 5-second increments up to 15 minutes.
     + Flex option enabled: the user can only increase the time up to an additional 15 seconds.

   - The down key decreases bake time in 5-second increments down to 35 seconds.
     + Flex option enabled: the user cannot decrease the time by more than 15 seconds.

3. Press the soft key adjacent to the belt that was adjusted to exit the belt speed controls.

Adjusting the Temperature

1. Press R2 (Figure 10) to access the temperature controls.

2. Adjust the temperature (range is 300-550°F [149-288°C]).

   - Press the up key to increase the temperature in 5°F/5°C increments.
     + Flex option enabled: the user can only increase the temperature up to an additional 10°F/5°C.
   - Press the down key to decrease the temperature in 5°F/°5C increments.
     + Flex option enabled: the user cannot decrease the temperature by more than 10°F/5°C.

3. Press R2 again to exit temperature controls.

Adjusting the Top and Bottom Air

1. Press R1 (Figure 10) to access the top air controls, or R3 to access the bottom air controls.

2. Adjust the air speed.

   - Press the up key to increase the air speed in 5% increments up to 100%.
     +Flex option enabled: the user can only increase the air speed by up to an additional 15%.

   - Press the down key to decrease the air speed in 5% increments down to 10%.
     +Flex option enabled: the user cannot decrease the air speed by more than 15%.

   - Press the soft key again to exit the air controls.

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left blank.*

Oven Modes

Config Mode

The CONFIG MODE (Figure 12) serves four main purposes:

1. To access the smart card screen.
2. To access the fault count screen.
3. To access the SETUP MODE.
4. To access the TEST MODE (service use only).

To access the CONFIG MODE, press the up key from the OVEN OFF MODE or COOLING DOWN MODE (if menus 5-8 are shown on the display, press the up key twice.

Smart Card Screen (Loading a Menu)

The smart card screen allows the user to
-Load a menu from smart card to oven.
-Save a menu from oven to smart card.

To load or save a menu,

1. Press L3 (Figure 12) to access the smart card screen (Figure 13).

2. Insert a smart card into the smart card slot (Figures 14 and 15), with the gold chip facing the front of the oven.

3. Load or save a menu.

   - Press R1 to load a menu from the smart card to the oven (Figure 13).

   - Press R2 to save a menu from the oven to the smart card (Figure 13).

Accessing the Fault Count Screen

From the CONFIG MODE (Figure 12), press R1 to access the fault counts screen (Figure 16, page 16). The oven will display the number of faults that have occurred.

Accessing the Setup Mode

From the CONFIG MODE (Figure 12), press L1 to access the SETUP MODE. The SETUP MODE allows the user to customize several oven settings - see below for more details.

Setup Mode

Figure 17, page 16.

The SETUP MODE serves four main purposes:

1. To change the display temperature.
2. To change the belt direction.
3. To access the edit option screen.
4. To change the display language.
5. To access the info screen.

To access SETUP MODE, press the up key from the OVEN OFF or COOLING DOWN MODE (to access the CONFIG MODE), and then press L1.

Figure 14: Loading a Smart Card

Figure 12: Config Mode

Figure 13: Smart Card Screen

Figure 15: Insert Smart Card Screen

Changing the Display Temperature

The oven can display the temperature in either Celsius or Fahrenheit units. To change the display temperature, press L1 in SETUP MODE (Figure 17).

Changing the Belt Direction

The oven's belt(s) can travel from left to right or right to left. To change the belt direction, press L2 in SETUP MODE (Figure 17).

Edit Modes Select Screen

The edit modes select screen (Figure 19) allows the user to switch between full edit, rigid, and flex for profile name, belt speed, temperature, and % air. For more information on the different edit options, see *Editing a Cooking Profile* on page 12.

To access the edit modes select screen,
1.   Press L3 (Figure 17) to access the password screen (Figure 18).
2.   Input the password 6 6 3 3 by pressing the soft keys adjacent to the numbers.

To change the edit option (Figure 19),
  -   Press L1 to select full edit or rigid for the profile name.
  -   Press L3 to select full edit, rigid, or flex for the belt speed.
  -   Press R1 to select full edit, rigid, or flex for the profile cook temperature setting.
  -   Press R3 to select full edit, rigid, or flex for the % air setting.

Changing the Display Language

NOTE: Feature is not available on all oven models.

From the setup menu screen (Figure 17), press R1 to set the language to English, French, German, or Spanish.

Changing the Speaker Volume

Press R2 (fig. 17) to change the volume of the speaker. The volume can be set to either 0, 1, 2, or 3 (where 0 is mute and 3 is the loudest setting).

Info Screen

The info screen (Figure 20) is used to display the following information in an easy to access place:
  -   Serial number
  -   Electrical compartment temperature
  -   Voltage
  -   Total time the oven has been on
  -   Total time the oven has been idle
  -   Firmware version

To access the info screen, press R3 within the SETUP MODE (Figure 17).

Updating the Firmware

From the oven off or cooling down screen,

1.   Insert the gray smart card (see Figure 14, page 15) with the gold chip facing the front of the oven. If multiple smart cards are required, they will be labeled in sequence - ensure the correct sequence is followed.

2.   From the COOLING DOWN or OVEN OFF MODE, press and hold the idle key until the oven resets (approximately 5 seconds). The display will go blank until the upload is complete.
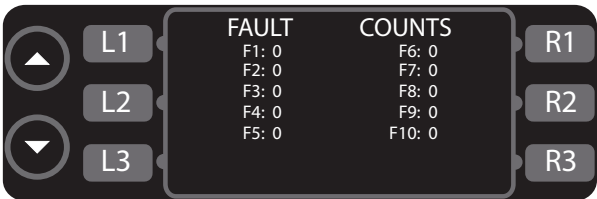
Figure 16: Fault Counts Screen
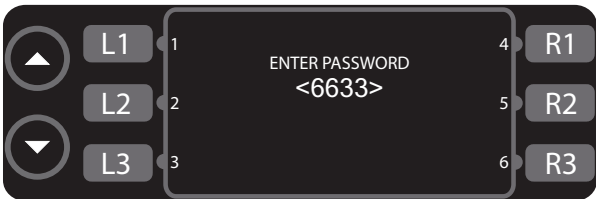
Figure 18: Password Screen

Figure 17: Setup Mode

Figure 19: Edit Option Screen

3. When the oven beeps one long high tone, the load was successful. If a second card was provided, insert it.
4. When the oven restarts and the display turns on, the update is complete. Remove the smart card from the oven.

NOTE: If the update is unsuccessful, the display will remain off and the oven will beep one long, low tone. If this occurs, repeat the above procedure. If the update fails multiple times, a smart card may be damaged. Please note that the oven will be inoperable until a successful update is performed. As such, TurboChef reinforces proper handling of smart cards to help prevent static damage, and recommends that each service technician keep a backup copy.

Test Mode

The TEST MODE serves the following purposes:
- To test individual oven components.
- To view oven information.
- To reset oven parameters.
- To input a new serial number.

To access the TEST MODE,
1. Press the up key from the OVEN OFF or COOLING DOWN MODE to access the CONFIG MODE.
2. Press the R3 soft key (Figure 12, page 15).
3. Input the password 2 4 3 3 (Figure 23).

The TEST MODE consists of two screens (Figures 21 and 22). Use the up and down keys to navigate between them.
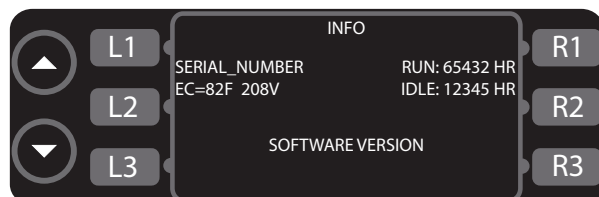
Figure 20: Info Screen
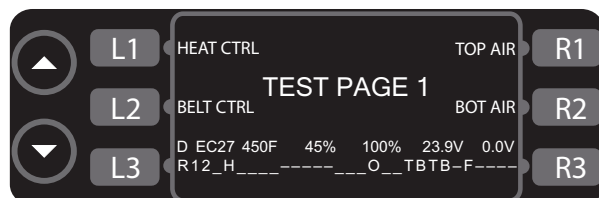
Figure 21: Test Mode Screen 1

From screen 1 of the TEST MODE, the user can:
-Access the heat control screen.
-Access the belt control screen.
-Manipulate the top and bottom blowers.
-View the status indicators.

From screen 2 of the TEST MODE, the user can:
- Input a new serial number
- Initiate a burn-in test
- Erase oven settings and fault counts
- Change the maximum temperature from 550°F to 600°F, or vice versa.

NOTE: DO NOT change this setting unless instructed by TurboChef.

- Enable/disable maintenance mode*
* The maintenance mode will show temperature, heater operation, and other diagnostics while the oven is running.

Accessing the Heat Control Screen

From screen 1 of the TEST MODE (Figure 21), press L1 to access the heat control screen (Figure 24).

NOTE: This mode is intended for setting gas pressures on other TurboChef conveyor ovens. Even though the HhC 2020 is electric, this mode can be used to energize the heaters to verify proper operation and readings.
- Press L1 to turn the heaters on.
- Press R1 to turn the heaters off.
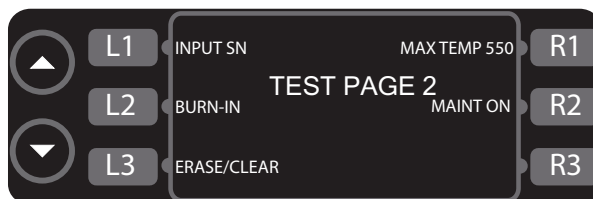
Figure 22: Test Mode Screen 2
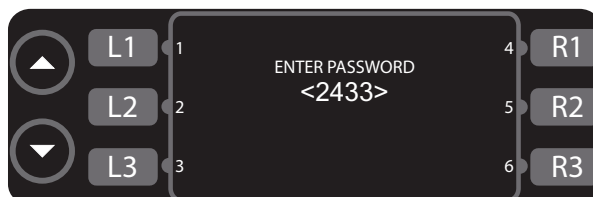
Figure 23: Password Screen
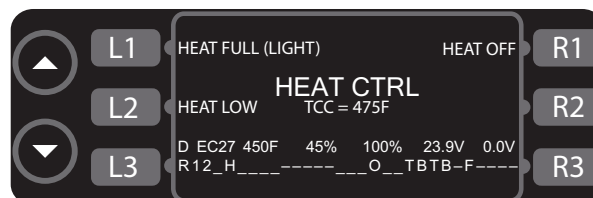
Figure 24: Heat Control Screen

Accessing the Belt Control Screen

From TEST MODE screen 1 (Figure 21, page 17), press L2 to access the belt control screen (Figure 25). Use this mode to verify the belts work correctly. The number after the belt speed shows the pulses read by the HES. The percentage is the amount of drive being asked of the CMSC (100% = 10VDC).

To change the belt's setting,
    -Press L1 to turn the belts off.

    -Press L2 to access the belt F controls.

    -Press L3 to access the belt R controls.

Manipulating the Top and Bottom Blowers

Figure 21, page 17.

The user can change the speed of the top and bottom blowers independently. To change the speed of the blowers,

1. From screen 1 of the TEST MODE, press R1 to access the top blower or R2 to access the bottom blower.
2. Press the up or down keys to change the speed of the selected blower in 5% increments. The percentage of air cannot go below 10% or above 100%.

Viewing the Status Indicators

Figure 26

The status indicators are located at the bottom of TEST MODE screen 1 and the heat control screen. The status indicators are split into two display lines.

Top Display Line

The top display line shows values relating to oven components. The letters a-c and e below, and on Figure 26, indicate the different top display line status indicators, which are explained below.

a   Shows which key is currently pressed.
    -U = up key
    -D = down key
    -a   = L1
    -b   = L2
    -c   = L3
    -f   = R1
    -g   = R2
    -h   = R3
    -P = back/off key
    -I   = idle key
    -S   = emergency stop key

b   Shows the temperature within the electrical compartment (temperature displayed in Celsius only).

c   Shows the temperature within the cook chamber.

d   Not applicable to this oven.

e   Shows the voltage of the power supply.
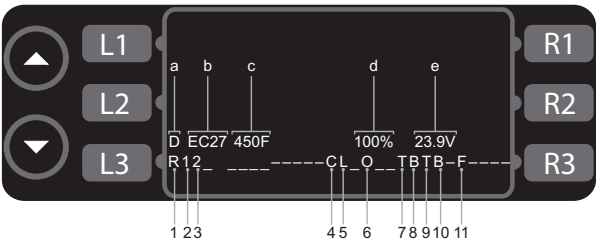
Figure 26: Status Indicator Explanation
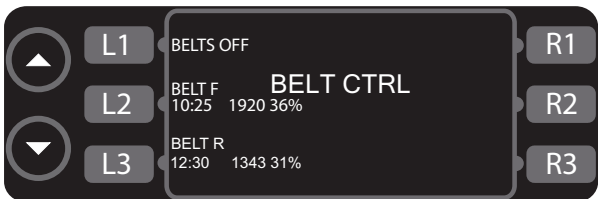
Figure 25: Belt Control Screen
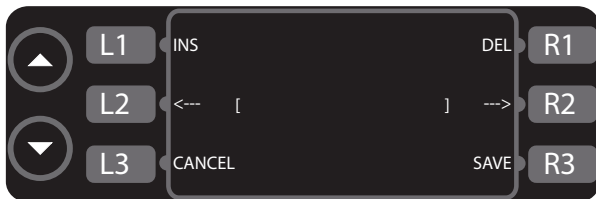
Figure 27: Enter New Serial Number Screen

Bottom Display Line

The bottom display line shows enabled inputs and outputs on the control board. The numbers 1-10 indicate the different bottom display line, which are explained below.

NOTE: A "-" or "_" displayed on the bottom display line denotes values that are in the off mode or closed.

1   "R" represents the real time clock pulse used by the control board to time oven functions. The "R" will blink once per second.

2   The "1" shows that the rear belt's conveyor motor's Hall Effect Sensor (HES) is sending a pulse to the control board.

3   The "2" shows that the front belt's conveyor motor's HES is sending a pulse to the control board.

4   The "C" will only appear if the voltage is below 220.

5   The "L" signifies that this is an electric oven.

6   The "O" will only be missing during an F8: High Limit Tripped fault.

7   The first "T" is displayed while the top air BMSC reports an ok status to the control board.

8   The first "B" is displayed while the bottom air BMSC reports an ok status to the control board.

9   The second "T" is displayed while the top air BMSC is enabled and receiving a command.

10   The second "B" is displayed while the bottom air BMSC is enabled and receiving a command.

11   If the "F" is displayed, the belts are traveling right to left. If the "F" is not displayed, the belts are traveling left to right.

Entering a New Serial Number

Figure 27

1.   Press L1 (Figure 22, page 17) on screen 2 of the TEST MODE to access the serial number input screen.

2.   Enter the new serial number.
    - The up key moves up through the available characters. i.e. A,B,C…
    - The down key moves down through the available characters i.e. A,+,-, ,9,8,…
    - INS (L1) inserts a space.
    - DEL (R1) deletes the selected character.
    - ---> (R2) moves the cursor to the right.
    - <--- (L2) moves the cursor to the left.

3.   Press R3 to save the changes or L3 to cancel.

Initiating a Burn-In Test

NOTE: Burn-in tests are for manufacturing use only. DO NOT initiate a burn-in test unless expressly instructed by TurboChef.

To initiate a burn-in test, Press L2 (Figure 22, page 17) on screen 2 of the TEST MODE.

The burn-in test (Figure 28) runs the oven for 45 minutes to ensure correct oven operation. When the burn-in test completes, the burn-in complete screen (Figure 29) will appear. Press any key to send the oven to the COOLING DOWN MODE. If the burn-in test fails, the applicable error code will appear and the oven will return to the COOL-ING DOWN or OVEN OFF MODE.

Erasing Oven Settings

To erase oven settings, press L3 (Figure 22, page 17) on screen 2 of the TEST MODE to access the erase screen (Figure 30). From the erase screen,

- Press L1 to erase all menu, belt, and configuration settings.
- Press L2 to clear the fault counters.
- Press L3 to clear the operational hours.

The oven will ask you to confirm the action (Figure 31 shows the confirm clear faults screen); press R3 to confirm or the back/off key to cancel.

⚠ CAUTION: Settings, fault counts, and hours cannot be retrieved once the erase option is confirmed.

Viewing the Serial Number

The serial number is located at the bottom of screen 2 of the TEST MODE (Figure 22, page 17).

⚠ CAUTION: Write this number down before replacing the I/O control board. Replacing the I/O control board will erase this number from the oven's memory.

If replacing a control board, see page 19 for re-entering the serial number.
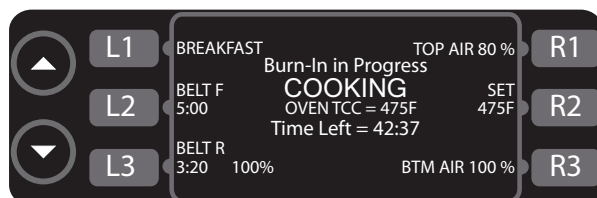
Figure 28: Burn-In Test Screen

Figure 29: Burn-In Complete Screen

Figure 30: Erase Screen

Figure 31: Confirm Clear Fault Counts Screen

Oven Systems

The Control System

This section contains information about the following components:
  - Control Board
  - Display
  - EMI Filter
  - Fuses
  - High-limit Thermostat
  - Keypad
  - Power Supply, 24VDC
  - Relay (K6 - Heaters)
  - Relay (K7 - Conveyor Direction)
  - Relay, Solid State
  - RTD
  - Smart Card Reader
  - Speaker
  - Thermostats - 120°F (Close on Rise)
  - Wire Harness

This section also contains testing procedures for the following components:
  - Power Supply - 24VDC
  - Relay (K6 - Heaters)
  - Relay (K7 - Conveyor Direction)
  - RTD

Control Board

The control board is powered by the 24 VDC power supply, and sends control voltage to each relay. See schematics (pages 37-40). 24 VDC can be measured at the J9 connector, pins 19 and 8.

Display

The vacuum fluorescent display is the primary user interface, and is powered by the control board using 5 VDC. Its input voltage can be tested at J7, pins 1 and 3 (page 39).

EMI Filter

The EMI filter helps suppress the amount of RF "noise" emitted by the oven, also filtering noise from entering the controls.

Fuses

The control circuit is ultimately protected by two 20-amp class CC fuses, which are in the line-voltage circuit (incoming voltage). The fuses are designed to blow in case of an over-current situation.

High-Limit Thermostat

The high limit thermostat is a 3-pole, manual reset thermostat with a trip point of 572ºF (300ºC). The thermostat interrupts power to the heater elements.

Keypad

The keypad is an 11-key membrane switch.

Power Supply - 24VDC

The power supply converts line voltage to 24 VDC. Line voltage is connected to terminals L & N. The output (24 VDC) is on terminals "-V" and "+V".

Testing Procedure

1. Check for line voltage at terminals L & N.

2. If correct voltage is present, check output (-V & +V) for 24 VDC (with output wires disconnected).

3. If voltage is present with output wires disconnected and not present when the wires are connected, inspect the wire harness for damage or shorts (pages 37-40 for schematics).

4. If wire harness is intact and undamaged, the power supply is damaged or defective and must be replaced (page A-8).

Relays, K6 (Heaters) and K7 (Conveyor Direction)

The K6 and K7 relays are double pole, double throw relays with a 24 VDC coil. The coil resistance is 585 Ω and the contact rating is 30A at 240 VAC. When 24 VDC is applied to the coil, the normally open contacts (7 & 4 or C & NO) close, applying line voltage to energize the heaters (K6) or reverse the conveyor direction (K7).

OVEN SYSTEMS

Testing Procedure

1. Disconnect line voltage to the unit.

2. Take a resistance reading of the coil.

3. If coil resistance is correct (585 Ω):

    a) Apply line voltage to the unit.

    b) Check for 24 VDC at the coil of the relay when the unit is calling for heat.

    c) Check the state of the contacts.
        -If the normally open contacts (7 & 4 or C & NO) are closed when coil voltage is applied, the relay is functioning normally.

        -If the normally open contacts (7 & 4 or C & NO are not closed when coil voltage is applied, the relay must be replaced (page A-7 and A-8).

4. If the coil resistance is incorrect, replace the relay.

Relay, Solid State - K5/K4 Heaters

The solid state relay is a 240 VAC, dual 40-amp relay, and switches power to the heaters.

RTD

The RTD is a resistance temperature detector used to detect the cavity temperature.

Testing Procedure

1. Disconnect the RTD from the I/O control board.

2. Place the RTD in a bowl of ice water for 2 minutes.

3. Take a resistance reading of the RTD.

4. If RTD resistance is not 100 Ω, RTD is defective and must be replaced.

NOTE: Use Figure 32 to determine resistance readings at temperatures other than freezing.

Smart Card Reader

The smart card reader allows the oven operator to load a menu/firmware update from a smart card. A menu that already exists in the oven can also be saved to a smart card. For instructions, see page 15.

Speaker

The speaker is separate from the control board, and provides audible feedback to the oven operator whenever a key is pressed or a fault occurs.

Thermostats - 120ºF (Close on Rise)

The cooling fan thermostats actuate the cooling fans when the temperature in either end bell reaches or exceeds 120ºF (49ºC).

Wire Harness

The wire harness distributes power to the oven's electrical components. See pages 37-40 for schematics.

ºF	0º	+20º	+40º	+60º	+80º	+100º	+120º	+140º	+160º	+180º	+200º
0º	90.03Ω	97.39Ω	101.74Ω	106.07Ω	110.38Ω	114.68Ω	118.97Ω	123.24Ω	127.50Ω	131.74Ω	135.97Ω
+200º	135.97Ω	140.18Ω	144.38Ω	148.57Ω	152.74Ω	159.90Ω	161.04Ω	165.17Ω	169.29Ω	173.39Ω	177.47Ω
+400º	177.47Ω	181.54Ω	185.60Ω	189.64Ω	193.67Ω	197.69Ω	201.69Ω	205.67Ω	209.64Ω	213.60Ω	217.54Ω
+600º	217.54Ω	221.47Ω	225.38Ω	229.28Ω	233.17Ω	237.04Ω	240.90Ω	244.74Ω	248.57Ω	252.38Ω	256.18Ω

ºC	0º	+10º	+20º	+30º	+40º	+50º	+60º	+70º	+80º	+90º	+100º
0º	100.00Ω	103.90Ω	107.79Ω	111.67Ω	115.54Ω	119.40Ω	123.24Ω	127.07Ω	130.89Ω	134.70Ω	138.50Ω
+100º	138.50Ω	142.29Ω	146.06Ω	149.82Ω	153.58Ω	157.31Ω	161.04Ω	164.76Ω	168.46Ω	172.16Ω	175.84Ω
+200º	175.84Ω	175.91Ω	183.17Ω	186.82Ω	190.45Ω	194.07Ω	197.69Ω	201.29Ω	204.88Ω	208.45Ω	212.02Ω
+300º	212.02Ω	215.57Ω	219.12Ω	222.65Ω	226.17Ω	229.67Ω	233.17Ω	236.65Ω	240.13Ω	243.59Ω	247.04Ω

Figure 32: Temperature/Resistance Relationship Class B. Resistance @ 0ºC = 100.0, Alpha = 0.003850

The Conveyor System

This section contains information about the following components, as well as testing procedures:
- Gear Drive (Conveyor Motor)
- Gear Drive (Conveyor Motor) Speed Controller (CMSC)

Gear Drive (Conveyor Motor)

The conveyor motor is a 1610 RPM, 3-phase motor with a built-in Hall Effect Sensor. The speed of the conveyor motor is controlled by the voltage frequency applied to the windings from the CMSC. The Hall Effect Sensor sends a DC pulse back to the control board to verify motor speed. The control board uses these pulses to determine the output DC voltage to the CMSC.

Single-belt HhC 2020 ovens contain one gear drive. Dual-belt ovens contains two gear drives.

Testing Procedure

1. Disconnect line voltage from the unit.

2. Take a resistance reading of the motor windings and use Figure 33 to verify that the resistance readings are correct.

3. If the resistance readings are correct, reconnect the motor wiring and then apply line voltage to the unit and check for voltage applied to the motor windings.

4. If no voltage is present, ensure the CMSC is operating properly (see below).

5. If CMSC is operating properly, inspect the wire harness for damage or shorts.

To	From	Description	Expected Resistance
White	Grey	Winding (A-B)	305-315 Ω
White	Black	Winding (A-C)	305-315 Ω
Grey	Black	Winding (B-C)	305-315 Ω
White, Grey, or Black	Green	Windings to chassis	Open

Figure 33: Conveyor Motor Ohm Chart

6. If the wire harness is intact and undamaged, and the CMSC is operating properly, the gear drive is damaged or defective and must be replaced.

Gear Drive (Conveyor Motor) Speed Controller (CMSC)

The CMSC converts single-phase line voltage to a three-phase output, and controls the speed of the gear drive via frequency output. The CMSC receives an input voltage (0-10 VDC) from the control board and adjusts the frequency output to the gear drive.

Testing Procedure

⚠ WARNING: Capacitors within the CMSC can retain charge after power is removed. Exercise extreme caution when handling the terminals.

⚠ WARNING: DO NOT connect incoming AC power to output terminals U, V, or W. This will seriously damage the Conveyor Motor Speed Controller.

1. Ensure that no faults appear on the display of the CMSC during oven operation. The control will display the frequency output if the system is operating correctly.

2. Check the input voltage on terminals L1 & L2 (200-240 VAC) and the DC voltage input on terminals 0V & AI (0.1-10 VDC).

3. If no input voltage is present, inspect the wire harness for damage or shorts (pages 37-38).

4. If DC control voltage is not present, check voltage output at I/O board. If no voltage is present at the I/O board, replace the board. J10-A13 to J9-C6 = front belt J10-A14 to J10-A6 = rear belt.

5. Check ohms of motor (Figure 33).

6. If wire harness is intact and undamaged, the CMSC is damaged or defective and must be replaced.

Accessing Parameters

⚠ WARNING: DO NOT perform this procedure unless instructed by TurboChef. Changing the parameters to other than those preset by TurboChef can damage critical oven components.

NOTE: "Motor Rated Speed" (07) is RPM of motor before gearbox, not after.

1. Open the right end bell (page A-8).

2. Locate the CMSC (page A-8).

3. Press the Ⓜ key.

4. Use the ⌃ and ⌄ keys to navigate the parameters. See page 40.

5. Press the Ⓜ key to access the parameter shown on the CMSC display.

6. Use the ⌃ and ⌄ keys to manipulate the parameter.

7. Press the Ⓜ key to return to the parameter selection.

8. Repeat steps 4-7 to manipulate other parameters as needed.

The Convection System

This section contains information about and testing procedures for the following components:
- Blower Motor
- Blower Motor Speed Controller (BMSC)
- Heaters

Blower Motor

The convection motor is a brushless AC switch reluctance type. Its top speed is 7100 RPM at 1 HP. The motor is controlled by a proprietary controller.

Testing Procedure

1. Disconnect line voltage from the unit.

2. Make sure the motor spins freely.

3. Take a resistance reading of the motor windings and use Figure 34 to verify the resistance readings are correct.

4. If the resistance readings are correct, reconnect motor wiring and then apply line voltage to the unit and check for voltage applied to the motor windings.

5. If no voltage is present, ensure the BMSC is operating properly (see below).

6. If BMSC is operating properly, inspect the wire harness for damage or shorts (pages 37-38).

7. If wire harness is intact and undamaged and the BMSC is operating properly, the blower motor is damaged or defective and must be replaced (page A-7 = lower, A-8 = upper).

Blower Motor Speed Controller (BMSC)

The motor controller is proprietary and will only operate the convection motor described above. The motor controller is controlled on command from the I/O control board and a 0-10VDC speed command from the I/O control board. See pages 27-28 for troubleshooting.

Heaters

The back and front convection heaters are rated at 6750 watts at 208 VAC with a resistance of 14.4 Ohms. The heaters are controlled by the K4/K5 solid state relay and can be tested in TEST MODE (see page 17).

To	From	Description	Expected Resistance
Black	Brown	Winding (A-B)	2.3-2.8 Ω
Black	White	Winding (A-C)	2.3-2.8 Ω
Red	White	Winding (B-C)	2.3-2.8 Ω
N/A	Green	Windings to chassis	Open

Figure 34: Blower Motor Ohm Chart (Motor Windings)

Troubleshooting

Overview of Troubleshooting

This section contains information on the following:

- Fault code descriptions
- Fault code troubleshooting
- Non-fault code troubleshooting

Fault Code Descriptions

Fault codes are logged in a fault counter (page 15) for troubleshooting. Upon completing the service call and restoring successful operation of the oven, the technician should clear all faults (see page 20).

F1: Blower Failure

This fault is displayed if for three consecutive times the control board does not receive the "status OK" signal from the BMSC.

The fault is cleared from the display if the blowers successfully restart upon starting a cook cycle or in TEST MODE.

F2: Low Temp During Cook

The oven will emit a beeping noise and display this fault if the cook cavity temperature falls 25°F (14°C) below the current cooking profile's set temperature, and the fault will be logged in the fault counter.

The fault is cleared from the fault display if the cook cavity temperature returns to within 25°F (14°C) of the set cooking temperature during cooking or in TEST MODE.

F4: Emergency Stop

This fault is displayed when the emergency stop key is pressed.

This fault acts as a counter that logs how many times the emergency stop key (page 9) has been pressed.

The fault is cleared from the display once the oven is restarted.

F5: CC Over Temp

This fault is displayed if the cook cavity's temperature reaches or exceeds 625°F (329.4°C).

The fault is cleared from the display once the oven is restarted and the temperature recedes below 625°F (329.4°C).

F6: EC Over Temp

This fault is displayed if the temperature within the electrical compartment reaches 149°F (65°C); however, the oven will not shut down and the fault will not be logged in the fault count log unless it reaches 158°F (70°C).

The fault is cleared from the display when the electrical compartment temperature recedes below 149°F (65°C).

F7: RTD Failure

This fault is displayed if the RTD circuit is open, shorted, reads above 645°F (340.5°C), or reads below -40°F (-40°C).

The fault is cleared from the display if the RTD circuit is closed, or the temperature reads within 645°F (340.5°C) and -40°F (-40°C)

F8: High Limit Tripped

This fault is displayed if the high limit switch trips. The switch trips when the high limit probe reads approximately 600°F (315.5°C).

The fault is cleared from the display when the high limit switch is manually reset.

F9: Belt Fault

This fault occurs if the conveyor belt fails to start or the conveyor is dragging.

The fault is cleared from the display if the conveyor belt starts when initiating cooking.

Fault Code and Description	When Active				Refer to...
	Warming	Idle	Cooking	Test	
F1: Blower Failure	✔	✔	✔	✔	Pages 27-28
F2: Low Temp During Cook			✔		Page 29
F4: Emergency Stop	✔	✔	✔	✔	N/A
F5: CC Over Temp		✔	✔	✔	Page 30
F6: EC Over Temp	✔	✔	✔	✔	Page 31
F7: RTD Failure	✔	✔	✔	✔	Page 32
F8: High Limit Tripped		✔	✔	✔	Page 32
F9: Belt Fault	✔	✔	✔		Page 33

Figure 35: Fault Code Table

NOTE: All fault codes except F2 and F9 will terminate cooking upon discovery. Any fault that occurs will be logged in the in the fault count log (page 15), except F6.

Fault Code Troubleshooting

From TEST MODE, you can test separate oven components to help diagnose an issue. To access TEST MODE, see page 17.

```
                    ┌─────────────────────────────┐
                    │     Troubleshooting:        │
                    │     F1:BLOWER FAULT         │
                    └─────────────────────────────┘
                                  │
                                  ▼
                    ┌─────────────────────────────┐
                    │ Access the TEST MODE.       │        ┌──────────────────────────┐
                    │ (page 17)                   │        │ Check the I/O control     │
        ─── NO ─────│ Are the status indicators at│── YES ─│ board, BMSC, and blower   │
                    │ location 7 and 8 present    │        │ motor wiring (pages 37-38)│
                    │ (page 18)?                  │        └──────────────────────────┘
                    └─────────────────────────────┘
```

Is the blower motor spinning freely? — NO → Remove obstruction or, if necessary, replace blower motor (page A-6 = lower, A-8 = upper).

YES

7 │ Open Left End Bell. Is a fault code present on the BMSC?

8 │ Open the Right End Bell. Is a fault code present on the BMSC?

NO YES YES NO

Do resistance measurements between windings and chassis agree with values on motor windings resistance table (Figure 36)? — NO → Replace the blower motor (page A-6 = lower, A-8 = upper).

YES

See page 28.

See page 28.

Is the wiring connected properly?

Check the BMSC, blower motor, and I/O control board (see page 28).

YES

NO → Correct wiring or replace I/O control board, BMSC, or blower motor if damaged (page A-6 = lower, A-8 = upper).

To	From	Description	Expected Resistance
Black	Red	Winding (A-B)	2.3-2.8 Ω
Black	White	Winding (A-C)	2.3-2.8 Ω
Red	White	Winding (B-C)	2.3-2.8 Ω
N/A	Green	Windings to chassis	Open

Figure 36: Motor Windings Resistance Table

Blower Motor Troubleshooting

NOTE: Continued from page 27.

1. Verify motor spins freely.
    - Motor seized: Unplug oven and correct obstruction or replace motor.
    - Motor spins freely: Verify motor windings (see Figure 36, page 27).

2. Verify motor windings are OK. Measure the resistance between windings and chassis. Unplug oven and replace motor if resistances do not agree with the values in the table on page 27. If motor is OK, proceed to step 3, below.

3. Status indicators TBTB should be visible when motors are on in TEST MODE. If any of these indicators are not present (for example, TB_B):

    a. Disconnect control wiring.

    b. Ground the "Status OK" wire of the motor controller that is being tested (pin 5 on the J2 connector) to chassis (reference wiring schematic of the blower motor controllers on pages 37-40).

    c. Keeping the wire grounded, check terminals on the control wiring plug for 0-10 VDC control voltage (reference drawing of Control Pinouts, page 39) while incrementing blower speed in TEST MODE (see *Manipulating Top and Bottom Blowers*, page 18, and page 17 for an illustration of TEST MODE).

    d. If DC voltage is present throughout all speed settings in TEST MODE (see *Manipulating Top and Bottom Blowers*, page 18, and page 17 for an illustration of TEST MODE), replace motor controller. If not, check harness and/or replace I/O board.

```
┌─────────────────────────────────┐
│         Troubleshooting:        │
│        F2: LOW COOK TEMP        │
└─────────────────────────────────┘
```

Restart the oven, access the TEST MODE, and turn on both the top and bottom blowers. Are the status indicators at location 6, 7, 8, and 9 present (pages 18-19)?

NO → Troubleshoot the blowers (pages 27-28).

YES → Are the nozzles and plenums correctly installed?

NO → Correctly reinstall the nozzles and plenums.

YES → Are all elements heating (ensure amp draw is correct - page 24)?

NO → Replace element(s).

YES → Open the right end bell.

Is the RTD properly connected to the I/O control board (page 37-40)?

NO → Fix wiring/connections.

YES → Is wire harness properly connected?

NO → Fix connection.

YES → Is the RTD damaged or defective (page 22)?

NO → Replace the I/O control board (page A-8).

YES → Test the RTD (page 22 for resistance/temperature chart).

Troubleshooting:
F5: CC OVER TEMP

Is anything obstructing regular airflow into the cook chamber?

—YES→ Remove the obstruction.

—NO→ Is an F1 fault present?

YES → Troubleshoot F1 fault (pages 27-28).

NO → Place the oven in TEST MODE and test the heaters (page 17). Do measurements show the heaters are ok (page 24)?

—NO→ Replace the defective heater(s).

YES → Is the solid state relay functioning properly?

—NO→ Replace the SSR (page A-7).

YES → Is the RTD damaged or defective (page 22)?

—NO→ Replace the I/O control board (page A-8).

YES → Test the RTD (page 22 for resistance/temperature chart).

Troubleshooting:
F6: EC OVER TEMP

Are the air filters on the back of the oven clean? —NO→ Clean the air filter(s) (page 7).

YES

Is the oven hot? —NO→ Access TEST MODE (page 17). Is the status indicator at position "b" (page 18) less than 65?

YES (from "Is the oven hot?")

YES (from status indicator)

NO → Replace the I/O control board (page A-8).

Open the left and right end bells. Are the cooling fans running?

YES → Check for
-Dirt or debris in the cooling fan blades.
-A heat source near the filter.

NO → Are the cooling fans receiving correct voltage (page 37-40)?

YES → Replace the cooling fans (page A-5).

NO → Is the cooling fan thermostat closed?

YES → Check the wiring (pages 37-40).

NO → Replace the thermostat (page A-6 and A-8).

Troubleshooting:
F7: RTD FAULT

Open the right end bell.

Is the RTD damaged or defective (page 22)?

—YES→ Replace the RTD (page A-8).

—NO→ Is the RTD connected properly to the I/O control board (pages 37-40)?

—NO→ Correct wiring (pages 37-40).

—YES→ Is the RTD open? Using an ohmmeter, measure at the control board (pages 37-40). RTD should measure approximately 100 Ω at 32°F (0°C) See page 22 for ohm/temperature chart.

—YES→ Replace the RTD (page A-8).

—NO→ Replace the I/O control board (page A-8).

Troubleshooting:
F8: HIGH LIMIT TRIPPED

Is the high limit thermostat tripped (page 21)?

—YES→ Reset and determine why it tripped - over temp, blower failure, etc.

Check if the high limit probe or RTD is damaged or defective, replace if needed (page A-8).

—NO→ Are all the contacts closed on the high limit thermostat?

YES→ Is the wiring correct (pages 37-40)?

NO→ Replace the high limit thermostat (page A-6).

—YES→ Replace the I/O control board (page A-8).

NO→ Correct wiring (pages 37-40).

Troubleshooting:
F9: BELT FAULT (Total Belt Run Failure)

Are there any obstructions that are blocking the conveyor's movement or is the conveyor belt damaged?

YES

NO

Remove obstruction or replace/repair the conveyor and restart the oven. Is the F9 fault code still present?

YES →

Remove the chain guard (page A-4). Is the chain damaged or obstructed in any way?

NO

YES

Open the right end bell (also open the left end bell if split belt conveyor). Is the wiring correct from the conveyor motor to the conveyor motor controller to the control board correct (pages 37-40)?

← NO — Correct wiring (pages 37-40).

Remove obstruction or, if necessary, replace the chain.

YES

Check that the CMSC settings correctly correspond with TurboChef settings (page 24 and 40).

← NO —

Is the conveyor motor, CMSC, or I/O control board damaged or defective? (See Figure 37 for motor winding resistance.)

— YES → Replace parts as required (see appendix).

To	From	Description	Expected Resistance
White	Gray	Winding (A-B)	305-315 Ω
White	Black	Winding (A-C)	305-315 Ω
Gray	Black	Winding (B-C)	305-315 Ω
White, Gray, or Black	Chassis	Windings to chassis	Open

Figure 37: Motor Ohm Chart (Motor Windings, not Hall Effect Sensor)

Non-Fault Code Troubleshooting

This section provides troubleshooting tips for issues that may occur independently of an oven fault.

```
┌─────────────────────────────────────────┐
│           Troubleshooting:               │
│        Cooling System Issue              │
└─────────────────────────────────────────┘
```

Is the oven in an area of moderate temperature (120°F [49°C] or cooler)?

- YES → **Does the oven have room to ventilate (not tightly enclosed by other appliances or fixtures)?**
  - NO → Move oven to open area or remove items that are in close proximity.
  - YES → **Is the air filter dirty and/or the vent obstructed?**
    - YES → Clean or replace air filter and/or remove the obstruction.
    - NO → **Is the cooling fan thermostat closed?**
      - NO → Replace the cooling fan thermostat (page A-6 and A-8).
      - YES → **Is line voltage applied (208-240 VAC) to the cooling fan?**
        - NO → Check wiring for problems (pages 37-40).
        - YES → Replace the cooling fans (page A-5).
- NO → Relocate oven to cooler area.

NOTE: There are two thermostats per unit. They are wired so that if either thermostat closes, power is applied to both cooling fans.

Troubleshooting: Food Not Cooking Properly

Does the problem occur for all programmed recipes? For example, are all recipes under-cooked/overcooked/etc.?

YES → Are there any fault codes present (page 25)?

YES → Troubleshoot the fault(s) using the steps on pages 27-33.

NO → Is the food item in the correct starting state (e.g., frozen, fresh, etc.)?

NO → Ensure the food item is being properly stored/prepared before cooking.

YES → Is the correct amount of food (portion) being cooked?

NO → Ensure that the correct amount is being cooked - not more or less than the recipe specifies.

YES → Is the food item being prepared correctly and consistently? For example, confirm meat is sliced at correct thickness, pizza dough is correct consistency, etc.

NO → Ensure that the food item is properly prepared.

YES → Does the problem occur EVERY time the food item is cooked?

YES → Are the plenums and nozzle plates correctly installed?

NO → Correctly reinstall plenums and nozzle plates.

YES → Replace the I/O control board (page A-8).

NO → Replace the I/O control board (page A-8).

Are the conveyor motors, CMSCs, blowers, BMSCs, and heaters working correctly (pages 23-24)? Is the wire harness properly connected (pages 37-40)?

NO → Replace/correct the operation of the conveyor motors and/or CMSCs, blower and/or BMSCs, heaters, and/or wiring harness. (pages 23-24, 37-40).

YES →

Troubleshooting: No Display - Screen is Blank

Does the keypad beep when a key is pressed?

- YES →
- NO →

NO branch:

Is the 24 VDC power supply receiving power?

- NO → Replace the fuses (page A-7).
- YES →

Is the power supply output 24 VDC?

- NO → Replace the power supply (page A-8).
- YES →

Is the control board receiving correct VDC (pages 37-40)?

- NO → Check wiring from the power supply to the control board. Correct wiring if necessary (pages 37-40).
- YES → Verify 5 VDC is present on pin 1 of the J3 connector (page 39). If not, replace the control board (page A-8).

YES branch:

Is wiring from the control board to the display (including the ribbon cable) OK?

- NO → Correct wiring. If cable is damaged, replace it.
- YES →

Is 5 VDC present on pin 1 of the J3 connector? (page 39)

- NO → Replace the I/O control board (page A-8).
- YES → Replace the display and ribbon cable. (page A-8)

Troubleshooting: No Keypad Input

Is the keypad cable properly connected to the control board?

- YES → Replace the keypad (page A-8).

    If the problem persists, or if beeps occur when buttons are pressed but commands do not register on the display, replace the control board (page A-8).
- NO → Correct wiring.

Schematics

NOTES:

COLOR CODE (LINE VOLTAGE)
BL - BLUE = LINE V (208/240)
BR - BROWN = LINE V (208/240)

COLOR CODE (LOW/CONTROL VOLTAGE)
BK - BLACK = 24 VDC COMMON
OR - ORANGE = STATUS INPUT
WH - WHITE = CONTROL OUTPUT
RD - RED = +24VDC

RELAY PINOUT

KEYPAD
HHC-1234

SMART CARD CONNECTOR
(100506)

(103023)
CABLE, SMART CARD

A - ANALOG

B - ADV I/O

C - STD I/O

SPEAKER
(104155)

J2-DISPLAY

(100193)   (100184)

VFD DISPLAY
64 X 128 DOTS
(100505)

RTD
(102088)

TURBOCHEF TECHNICAL SUPPORT
800-908-8726

REAR CONVEYOR MOTOR AND CONTROL (RIGHT)

(103581)
COMMANDER SL

(100877)
RED
WHITE
YELLOW

WHITE
GRAY
BLACK

(101279)
K7
B-18 (RED)
C-13 (WHT)

(101211)
24VDC POWER SUPPLY
GV- V+ L N

VOLTAGE MODULE
(100783)
B 16
A 5

EMI FILTER
6VSK1
(100539)

(103581)
COMMANDER SL

FRONT CONVEYOR MOTOR AND CONTROL (LEFT)

(100877)
RED
WHITE
YELLOW

WHITE
GRAY
BLACK

(LEFT) COOLING FANS (RIGHT)
(100085)

OT 1 - 120°F
(102086)
C NO

OT 1 - 120°F
(102086)
NO

EMI FILTER
6VSK1
(100539)

OT1
MANUAL RESET
(100516)
L1-L3
L3-L2
L2-L1

(101279)
K6
B-17 (RED)
C-21 (WHT)

BMSC
(100443)
J5
M1 RED
M2 BLACK
M3 WHITE
GREEN
240 VAC 3 PHASE OUT
BLWR MTR BTM (CCW)
(HCT-4205)
J2
Analog Speed 0-10V   A-17 (RED)
I/O COMMON   B-6 (BLACK)
ENABLE   B-2 (WHITE)
I/O COM
STATUS OK   B-10 (ORANGE)
I/O COMMON   GND
180-240 VAC IN

B11 (ELEMENT #, TERMINAL#)
B1_ = ELEMENT 1
B_1 = TERMINAL 1

A11
A21
A31

6kW FRONT
HCT-4161

A32
A22
A12

B11
B21
B31

6kW REAR
HCT-4162

B32
B22
B12

L1 L3 L2 L3 L2 L1

K4   A2
     A1
K5   B2
     B1
(101281)

C-18 (RED)

C-22 (WHT)

BR   BL
F1   F2
E1

F1: 20 AMPS CLASS CC (100599)
F2: 20 AMPS CLASS CC (100599)

BMSC
(100443)
J5
M1 RED
M2 BLACK
M3 WHITE
GREEN
240 VAC 3 PHASE OUT
BLWR MTR TOP (CCW)
(HCT-4205)
J2
Analog Speed 0-10V   A-18 (RED)
I/O COMMON   A-5 (BLACK)
ENABLE   B-1 (WHITE)
I/O COM
STATUS OK   C-1 (ORANGE)
I/O COMMON   GND
180-240 VAC IN

SCHEMATICS

TurboChef Schematic, HHC-2020 VFD Display, 3PH, WYE, 380-415 VAC, 60 HZ/50 — DWG NO HCT-4131

RED - VDC OUTPUT
WHITE - CONTROL OUTPUT
BLACK - GROUND
ORANGE - STATUS OUTPUT

Analog I/0

MOLEX-20POS

CONVEYOR F VDC (0-10) — 13
CONVEYOR R VDC (0-10) — 14
15
BELT R, BELT F +5 VDC TO HALL — 16
BTM BLR 0-10VDC OUTPUT — 17
TOP BLR 0-10VDC OUTPUT — 18
19
20

11 — 1
12 — 2
— 3
— 4
5 — TOP BLR GND
6 — CONVEYOR R GND
7 — CC RTD GND
8 — CC RTD INPUT
9 — CC RTD INPUT
10

A

J10

Mini-fit Jr. 39-28-8200

J8 **B** MOLEX-24POS

24 23 22 21 20 19 18 17 16 15 14 13
REAR BELT1-SPEED TO HALL
FRONT BELT2-STAT TO HALL
K7 +24VDC OUTPUT
K6 +24VDC OUTPUT
VOLT SELECT

12 11 10 9 8 7 6 5 4 3 2 1
BTM BLR STATUS INPUT
BELT REAR GND TO HALL
BELT FRONT GND TO HALL
BTM BLR GND
ELEC/GAS SELECT GND
ELECTRIC/GAS SELECT
BTM BLR ENABLE
TOP BLOWER ENABLE

Advanced I/O
Mini-fit Jr. 39-28-8240

Standard I/O
Pins 8 and 19 are the
24V Power Supply input

J9

11 — | — 22 K4/K5 PID OUTPUT
10 — | — 21 K6 HX 2 OUTPUT
9 — | — 20 SPEAKER OUTPUT
24 VDC (-) INPUT — 8 — | — 19 24 VDC (+) INPUT
SPEAKER GND — 7 — | — 18 K4/K5 HX1 +24VDC OUT
CONV F GND — 6 — **C** — 17
HI-LIMIT GND — 5 — | — 16
4 — | — 15
3 — | — 14
2 — | — 13 K7 CONV DIR OUTPUT
TOP BLR STATUS INPUT — 1 — | — 12 HI-LIMIT INPUT

MOLEX-22POS

Mini-fit Jr 39-28-8220

Title	HHC-2020 I/O CONTROL PINOUTS		
Size	Number HHC-4130		Rev A
Date	JUNE 16, 2008	Drawn by	MJP/JKP
Filename		Sheet	2 of 3

SCHEMATICS

	A	B	C	D	

Control Techniques: Commander SL (EMERSON)

Conveyor Motor - BGFM12-240TD2NX (SMALL FRAME)
Dual or Single Conveyor (-2 VERSON)

Passward: "0" (Stock password, should change in Production)
Pram Setting   Note
01   0.0   Minimum set speed in Hz
02   120   Maximum set speed in Hz
03   0.0   Accelleration rate (in sec/100Hz)
04   0.0   Decelleration rate (in sec/100Hz)
05   AV   Drive confguration
06   0.15   Motor rated current
07   1610   Motor rated speed   (Note: RPM of motor - not output)
08   208   Motor rated voltage
09   0..63   Motor power factor
10   OPEn   Parameter access
11   0   Start/Stop logic
15   0.0   Jog referance
17   OFF   Enable negative prreset speeds
18   0.0   Preset Speed 1
19   0.0   Preset Speed 2
20   0.0   Preset Speed 3
21   0.0   Preset Speed 4
25   0   Securty Setup
27   0   Power up keypad referance
29   no Load defaults
30   1   Ramp mode select
31   2   Stopping mode select
32   OFF   Dynamic V to f select
33   2   Catch a spinning motor select
35   n=0   Terminal T4 output mode select
37   3   Maximum switching freq (in kHz)
39   60.0   Motor rated frequency
40   Auto   Number of motor poles
41   Fd   Voltage mode select
42   3.0   Low frequency voltage boost

The rest are read only

Title	HHC-2020 I/O CONTROL PINOUTS		
Size	Number HHC-4130		Rev A
Date	JUNE 16, 2008	Drawn by	MJP/JKP
Filename		Sheet	3 of 3

Appendix - Replacing Oven Components

Replacing Oven Components

⚠️ WARNING: Before removing or replacing any oven component, thoroughly read the safety instructions found at the front of this manual and *Oven Systems* (pages 21-24). Adhere to all precautions and warnings outlined in these sections, as failure to do so could result in serious injury or death.

Part Details...			Locate the Part Here...		
Item	Part Number	Qty. Per Oven	Outside of End Bells (Page A-4)	Left End Bell (Page A-6)	Right End Bell (Page A-8)
Air Filter	HCT-4067	2	✔		
Back Panel	HCT-4105	2	✔		
Blower Motor Assembly	HCT-4205	2		✔	✔
Blower Motor Controller	100443	2		✔	✔
Blower Wheel	104107	2		✔	✔
Cable, Display, Power, 2-Pin	100193	1			✔
Cable, Display, Ribbon	100184	1			✔
Cable, Smart Card Reader	100182	1			✔
Chain, Conveyor	HCT-4143	1			
Chainguard, Left (Split-belt config only)	HCT-4038	1	✔		
Chainguard, Right	HCT-4041	1	✔		
Channel	HCT-4076	1	✔		
Control Board	CON-7002	1			✔
Conveyor Controller	HHC-6630-2	2		✔	✔
Conveyor Motor	HCT-4120	2*		✔	✔
Conveyor (Single Belt)	HCT-4140	1	✔		
Conveyor (Split Belt 50/50)	HCT-4096	1	✔		
Conveyor (Split Belt 70/30)	HCT-4115	1	✔		
Cooling Fan	TC3-0433	2	✔		
Crumb Tray	HCT-4045	2	✔		
Display, VFD	NGC-3023	1			✔
Distribution Block	HCT-4141	1		✔	
EMI Filter	100539	2		✔	✔
Eyelid	HCT-4028	2	✔		
Finger Guard	100086	2	✔		
Fuse, 20 Amp, Class CC	100599	2		✔	
Fuse Block	103548	1		✔	
Gear Motor Cover (Single-belt config only)	HCT-4142	1	✔		
Hanger	HCT-4148	1	✔		
Hatch	HCT-4209	1	✔		
Hatch Latch	100777	2	✔		
Heat Slinger	102708	2		✔	✔
Heater, Back	HCT-4161	1	✔		
Heater, Front	HCT-4162	1	✔		

* Quantities will differ depending on conveyor type.

Part Details...			Locate the Part Here...		
Item	Part Number	Qty. Per Oven	Outside of End Bells (Page A-4)	Left End Bell (Page A-6)	Right End Bell (Page A-8)
Heater Cover	HCT-4032	1	✔		
Jetplate	HCT-4099	2	✔		
Keypad	HHC-1234	1	✔		
Leg	100785	4	✔		
Plenum	HCT-4020	2	✔		
Power Cord	HCT-4116-3 (NEMA 15-50P) or HCT-4116-2 (IEC60309)	1		✔	
Power Cord Retainer	I5-9211	2	✔		
Power Supply	101211	1			✔
Power Supply Bracket	HCT-4103	1			✔
Relay, Mechanical, K6	101279	1		✔	
Relay, Mechanical, K7	101279	1			✔
Relay, Solid State, K4/K5	NGC-3005	1		✔	
RTD	HHC-6517-2	1			✔
Shelf Tray (Crumb Tray Extension)	HCT-4050	2	✔		
Smart Card Reader	100506	1			✔
Speaker	104155	1			✔
Support, Top Plenum	HCT-4169	1	✔		
Thermostat, Cooling Fan	102086	2		✔	✔
Thermostat, High Limit	102075	1		✔	
Voltage Sensor	100783	1			✔
Wire Harness, EMI to Fan Control, Conveyor Control	HCT-4086-7	1			
Wire Harness, EMI to Fan Control, Power Supply, Conveyor Control	HCT-4086-5	1			
Wire Harness, Fuse Block to EMI	HCT-4086-6	1			
Wire Harness, Fuse Block to High Limit	HCT-4086-3	1			
Wire Harness, Fuse Block to SSR, 4" LG	HCT-4086-9	1			
Wire Harness, Fuse Block to SSR, 4.25" LG	HCT-4086-8	1			
Wire Harness, High Limit to Distribution Block	HCT-4086-4	1			
Wire Harness, High Voltage, Main	HCT-4086-1	1			
Wire Harness, LOV	HCT-4163-1	1			
Wire Harness, SSR to Distribution Block	HCT-4086-2	1			

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Replacing Items - Outside of End Bells

⚠ WARNING: Before removing or replacing any oven component, thoroughly read the safety instructions found at the front of this manual and *Oven Systems* (pages 21-24). Adhere to all precautions and warnings outlined in these sections, as failure to do so could result in serious injury or death.

⚠ CAUTION: Before removing/installing any component, make sure it is disconnected from the wire harness (where applicable).

NOTE: Only single-belt ovens will have the *Gear Motor Cover*. Dual-belt ovens will have the *Chainguard, Left*.

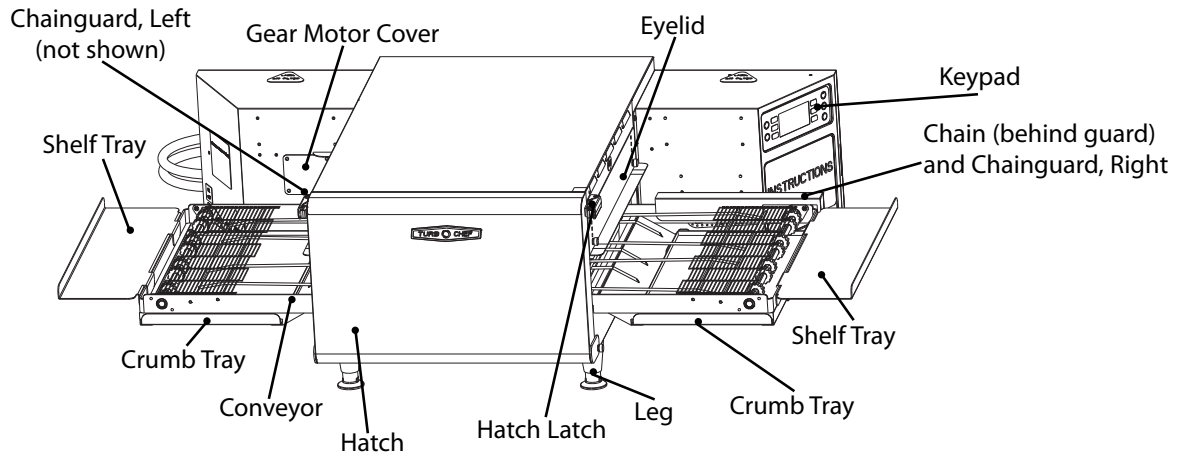Figure A-1: Front Oven Components
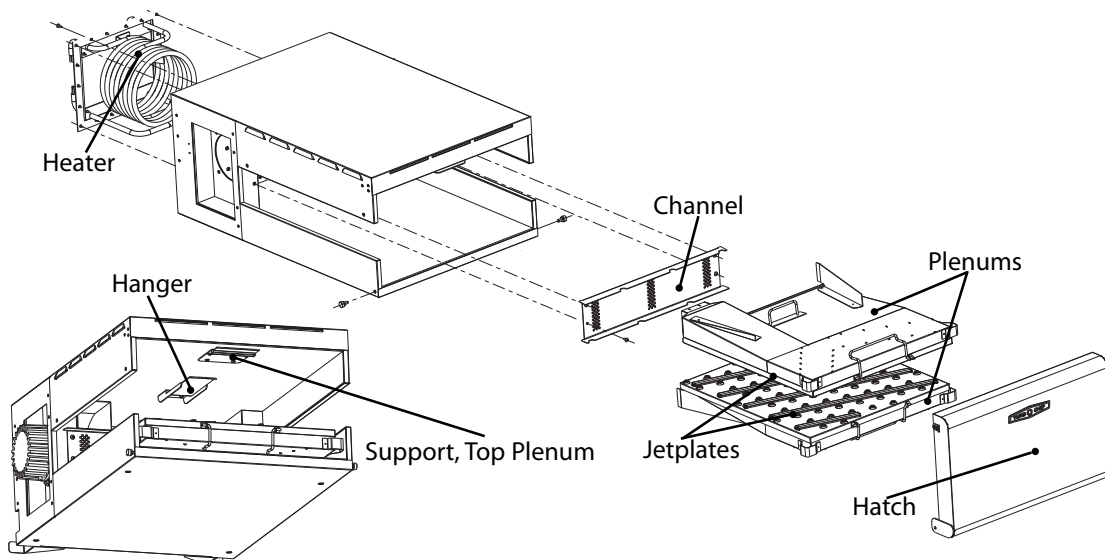

Figure A-2: Inner Oven Components

| Item	Part Number	Hardware Description	Hardware Part Number(s)
Air Filter	HCT-4067	None	None
Back Panel	HCT-4105	Screw, #10-32 x .5, PPH, INT Tooth, SS	101460 (x2)
Chain, Conveyor	HCT-4143	None	None
Chainguard, Left	HCT-4038	None	None
Chainguard, Right	HCT-4041	None	None
Channel	HCT-4076	Screw, SH MTL, #8 x 1/2 Serrated PHTRH	101688 (x4)
Conveyor, Single	HCT-4140	Chain, #35, 52 Links, With Master Link, Endless	HCT-4143
Conveyor, Split Belt 50/50	HCT-4096	Chain, #35, 52 Links, With Master Link, Endless	HCT-4143 (x2)
Conveyor, Split Belt 70/30	HCT-4115	Chain, #35, 52 Links, With Master Link, Endless	HCT-4143 (x2)
Cooling Fan	TC3-0433	Nut, KEPS Hex, #6-32, EXT Tooth, CRES Screw, SH MTL, #8 x 1/2 Serrated PHTRH	102961 (x4) 101688 (x4)
Crumb Tray	HCT-4045	None	None
Eyelid	HCT-4028	Screw, Thumb w/W HD, #1/4-20x1/2", SS	101752 (x2)
Finger Guard	100086	None	None
Gear Motor Cover	HCT-4142	Nut, #10-32, SERR HEX FLNG, SS	100903 (x4)
Hanger	HCT-4148	Screw, SH MTL, #8 x 1/2 Serrated PHTRH	101688 (x4)
Hatch	HCT-4209	Screw, Thumb w/W HD, #1/4-20x1/2", SS	101752 (x2)
Hatch Latch	100777	Screw, SH MTL, #8 x 1/2 Serrated PHTRH	101688 (x3)
Heater, Back	HCT-4161	Screw, SH MTL, #8 x 1/2 Serrated PHTRH	101688 (x22)
Heater, Front	HCT-4162	Screw, SH MTL, #8 x 1/2 Serrated PHTRH	101688 (x22)
Heater Cover	HCT-4032	Screw, SH MTL, #8 x 1/2 Serrated PHTRH	101688 (x14)
Jetplate	HCT-4099	None	None
Keypad	HHC-1234	None	None
Leg	100785	None	None
Plenum	HCT-4020	None	None
Power Cord Retainer	I5-9211	Screw, SH MTL, #8 x 1/2 Serrated PHTRH	101688 (x2)
Shelf Tray	HCT-4050	None	None
Support, Top Plenum	HCT-4169	Screw, SH MTL, #8 x 1/2 Serrated PHTRH	101688 (x4)
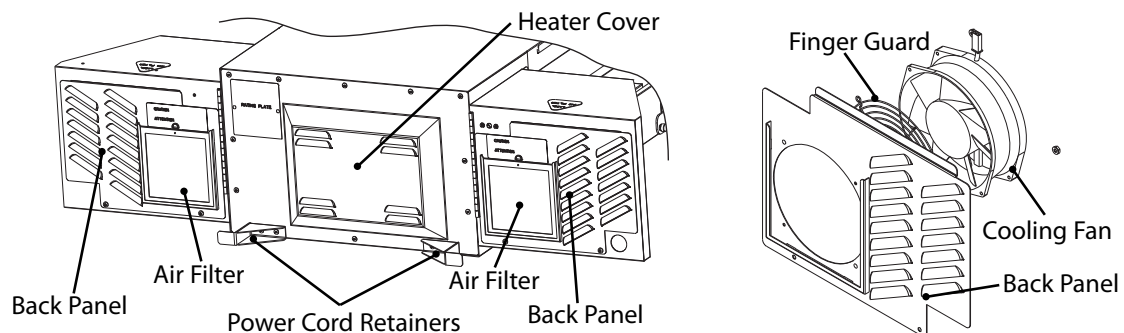
Figure A-3: Rear Oven Components

Replacing Items - Left End Bell

⚠ WARNING: Before removing or replacing any oven component, thoroughly read the safety instructions found at the front of this manual and *Oven Systems* (pages 21-24). Adhere to all precautions and warnings outlined in these sections, as failure to do so could result in serious injury or death.

⚠ CAUTION: Before removing/installing any component, make sure it is disconnected from the wire harness (where applicable).

NOTE: Single belt ovens will not have a *Conveyor Motor* in this location. Instead, the *Gear Motor Cover* will be installed (see page A-4).
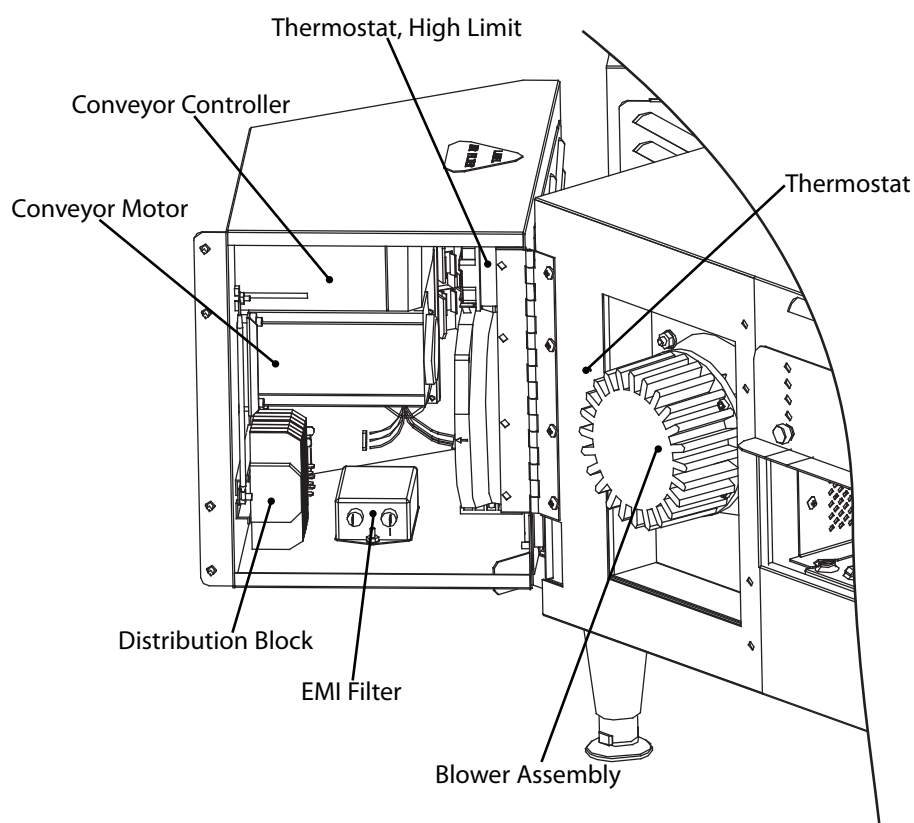
Thermostat, High Limit

Conveyor Controller

Conveyor Motor

Thermostat

Distribution Block

EMI Filter

Blower Assembly

Figure A-4: Left End Bell Components, Left End Bell Open

Blower Wheel

Heat Slinger
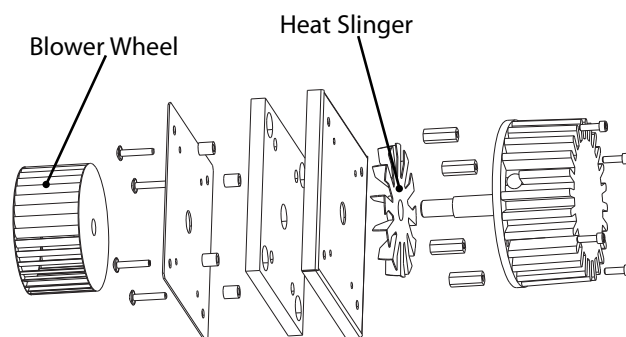
Figure A-5: Blower Motor Assembly Detail

| Item	Part Number	Hardware Description	Hardware Part Number(s)
Blower Motor Assembly	HCT-4205	Nut, 1/4-20, Serrated HEX Flange, Plated Steel Screw, #10-32 x 5/8, SKT HD, PLT Standoff, #10-32 x I, F/F, 3/8 HEX, PLT Spacer, #10 (.192) x 3/8 OD X 7/16, AL Screw, #10-32 x 1", PHTRHD, SS	100906 (x4) 104104 (x4) 104105 (x4) 104111 (x4) 102941 (x4)
Blower Motor Controller	CON-7013	Nut, KEPS HEX, #6-32, EXT Tooth, CRES	102961 (x4)
Blower Wheel	104107	None	None
Conveyor Controller	HHC-6630-2	Nut, KEPS HEX, #6-32, EXT Tooth, CRES	102961 (x4)
Conveyor Motor	HCT-4120	Nut Plate, 1/4-20 Screw, 1/4-20 x 3/4 HEX Washer HD Serrated, CRES Sprocket, Chain 035 .5" Bore 10 T	HCT-4107 (x2) 101396 (x4) 103562
Distribution Block	HCT-4141	Nut, #10-32, SERR HEX FLNG, SS	100903 (x2)
EMI Filter	100539	Nut, KEPS HEX, #6-32, EXT Tooth, CRES	102961 (x2)
Fuse, 20 Amp, Class CC	100599	None	None
Fuse Block	103548	Nut, #8-32, HEX, SS	101000
Heat Slinger	102708	None	None
Relay, Mechanical, K6	101279	Nut, KEPS HEX, #6-32, EXT Tooth, CRES	102961 (x2)
Relay, Solid State, K4/K5	NGC-3005	Screw, #8 x 3/8 PH MOD TRUSS CRES	101682 (x2)
Thermostat, Cooling Fan	102086	Screw, #6 x 1/2, PPHD, DRL-PT, SS	101687 (x2)
Thermostat, High Limit	102075	Screw, M4X 0.7 x 8, PPHD, INT Tooth, SS	101672 (x2)
Power Cord	HCT-4116-3 or HCT-4116-2	None	None
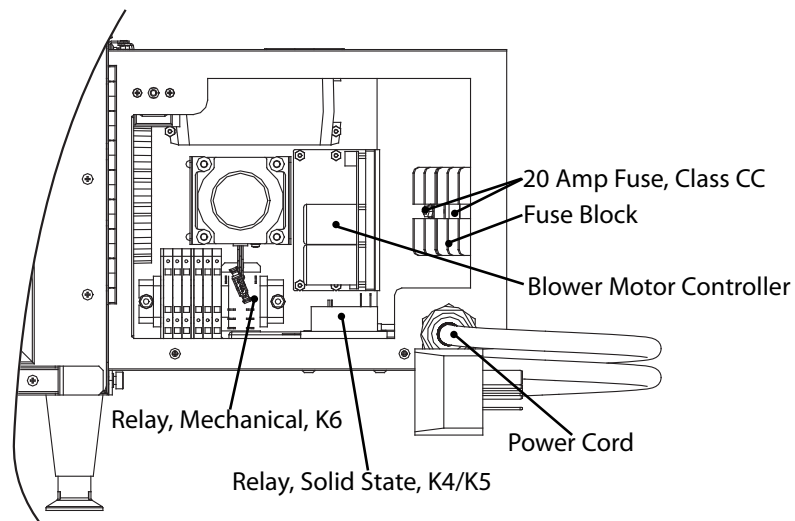
Figure A-6: Left End Bell Components, Back Panel Removed

Replacing Items - Right End Bell

⚠ WARNING: Before removing or replacing any oven component, thoroughly read the safety instructions found at the front of this manual and *Oven Systems* (pages 21-24). Adhere to all precautions and warnings outlined in these sections, as failure to do so could result in serious injury or death.

⚠ CAUTION: Before removing/installing any component, make sure it is disconnected from the wire harness (where applicable).
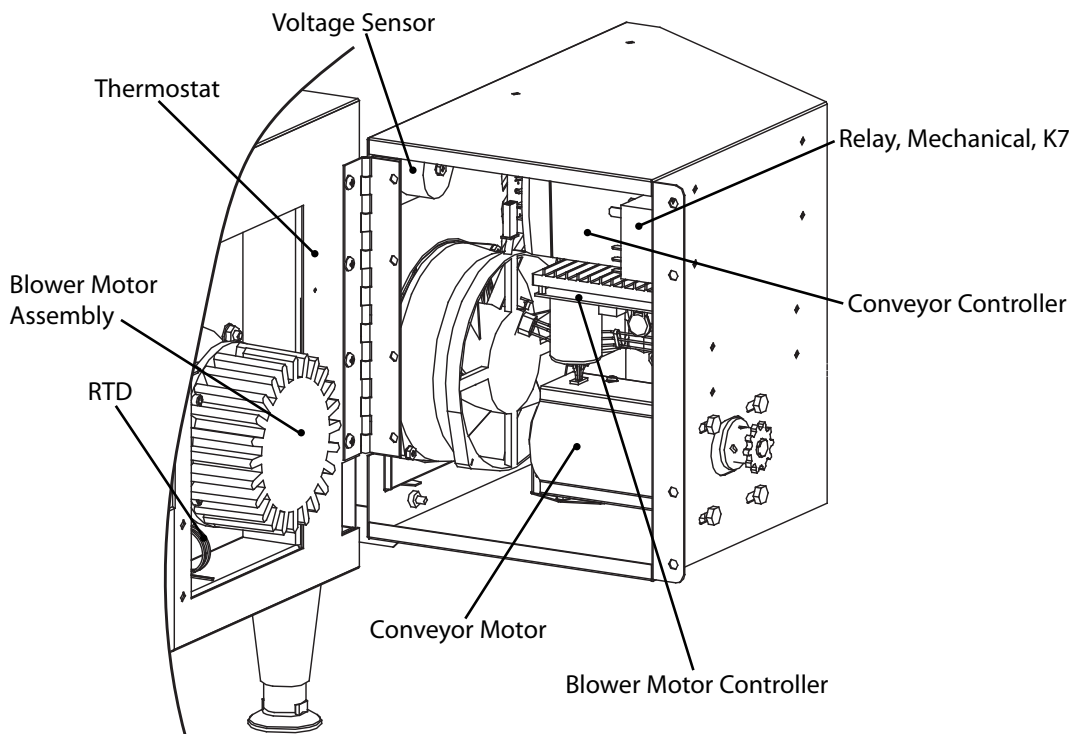
Voltage Sensor

Thermostat

Relay, Mechanical, K7

Blower Motor Assembly

Conveyor Controller

RTD

Conveyor Motor

Blower Motor Controller

Figure A-7: Right End Bell Components, Right End Bell Open

Display, VFD

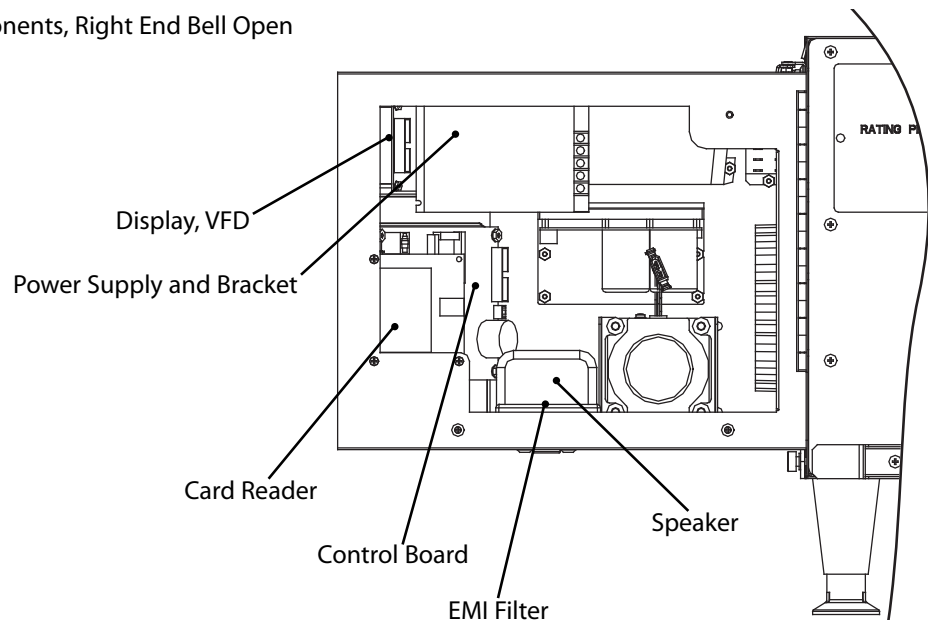Power Supply and Bracket

RATING P

Card Reader

Speaker

Control Board

EMI Filter

Figure A-8: Right End Bell Components, Back Panel Removed

Item	Part Number	Hardware Description	Hardware Part Number(s)
Blower Motor Assembly	HCT-4205	Nut, 1/4-20, Serrated HEX Flange, Plated Steel Screw, #10-32 x 5/8, SKT HD, PLT Standoff, #10-32 x I, F/F, 3/8 HEX, PLT Spacer, #10 (.192) x 3/8 OD X 7/16, AL Screw, #10-32 x 1", PHTRHD, SS	100906 (x4) 104104 (x4) 104105 (x4) 104111 (x4) 102941 (x4)
Blower Motor Controller	CON-7013	Nut, KEPS HEX, #6-32, EXT Tooth, CRES	102961 (x4)
Cable, Display, Power, 2-Pin	100193	None	None
Cable, Display, Ribbon	100184	None	None
Cable, Smart Card Reader	100182	None	None
Control Board	CON-7002	Nut, KEPS HEX, #6-32, EXT Tooth, CRES Standoff, #6 x 1/2 long, Thru Round	102961 (x4) 101869 (x4)
Conveyor Controller	103581	Nut, KEPS HEX, #6-32, EXT Tooth, CRES	102961 (x4)
Conveyor Motor	HCT-4120	Nut Plate, 1/4-20 Screw, 1/4-20 x 3/4 HEX Washer HD Serrated, CRES Sprocket, Chain 035 .5" Bore 10 T	HCT-4107 (x2) 101396 (x4) 103562
Display, VFD	NGC-3023	Nut, KEPS HEX, #4-40 EXT Tooth Standoff, Round, .12 ID, .25 OD x .50 long	102960 (x4) 101954 (x4)
EMI Filter	100539	Nut, KEPS HEX, #6-32, EXT Tooth, CRES	102961 (x2)
Power Supply	101211	Screw, M3 x 8mm long, PPHD, SS	101688 (x3)
Power Supply Bracket	HCT-4103	Nut, KEPS HEX, #6-32, EXT Tooth, CRES	102961 (x2)
Relay, Mechanical, K7	101279	Nut, KEPS HEX, #6-32, EXT Tooth, CRES	102961 (x2)
RTD	HHC-6517-2	Screw, SH MTL, #8 x 1/2 Serrated PHTRH	101668
Smart Card Reader	100506	Nut, #6-32, Serrated Hex Flange Screw, 6-32 x .38, PFH, 100DEG, SS Standoff, #6-32 x 1/2, M/F, Hex, Zinc	100902 (x3) 101430 (x3) 101941 (x3)
Speaker	104155	Clip, Speaker Mounting Screw, #8 x 3/8 PH MOD TRUSS CRES	HCT-4104 101682 (x2)
Thermostat	102086	Screw, #6 x 1/2, PPHD, DRL-PT, SS	101687 (x2)
Voltage Sensor	100783	Nut, KEPS HEX, #6-32, EXT Tooth, CRES	102961

For service or information: